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ANOTHER veteran of the fraternity has passed away, in the person of Mr. Charles Nettleton, ex-Secretary of the American Gas Light Association, who died suddenly, at his home in this city, on Thursday last. He was in his 73d year.

[OFFICIAL NOTICE.]

Fifteenth Annual Meeting, Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION, QUINCY, ILLS., May 2d, 1892.

The Fifteenth Annual Meeting of the Western Gas Association will be held at Detroit, Mich., on the 18th, 19th and 20th days of May. The Russell House has been designated by the Committee of Arrangements as the headquarters of the Association, while the business sessions will be conducted in the Armory of the Detroit Light Infantry, two blocks distant from the Russell House. As an unusually large number of rooms has already been engaged, and the attendance promises to be unprecedentedly great, it behooves all those who have not yet done so to write for quarters without further delay. While there is no reason for fearing that we shall suffer from the discomforts caused by an overcrowded hotel, the reservation of rooms will tend to insure the greater comfort of our members by enabling Landlord Chittenden to perfect his arrangements and complete his assignments before the rush sets in.

The paper list for the Detroit meeting is as follows:

"Origin of Coal and Petroleum," by Mr. A. E. Forstall, Newark, N. J.

"New Features in the Routine Office Work of Small Gas Companies," by Mr. Walter Lee Brown, Evanston, Ills.

"Every Day Gas Analysis," by Mr. Wm. A. Stedman, Jr., St. Louis, Mo.

"The Advantages of Recuperative Furnaces in the Utilization of Heat," by Mr. Fred. Bredel, Milwaukee, Wis.

"Petroleum Products—Hydrocarbon Employed in Gas Manufacture," by Mr. C. M. Higgins, New York, N. Y.

"Fuel Gas as Viewed Through a Coal Gas Man's Spectacles," by Mr. K. M. Mitchell, St. Joseph, Mo.

"Practical Photometry Simplified for Daily Use," by Mr. B. E. Chollar, St. Louis, Mo.

"The Construction and Operation of Half-Depth Regenerative Furnaces for Firing with Cheap Coal," by Mr. W. H. Odiorne, Springfield, Ills.

All of the foregoing papers are in type and should be ready for distribution within a few days. Copies will be mailed to those who desire to look them over in advance of the date of the meeting if the Secretary is advised by letter or postal of the names to which they should be addressed. A free and thorough discussion is invited by the authors, and will add greatly to the interest and value of the meeting.

The Question-Box is already assuming plethoric proportions, as is evidenced by its present contents, which are as follows:

"What experience has been had in the spontaneous combustion of coal, and what is the best remedy for prevention?"

"Does it pay to dispense with stop-cocks and boxes on service pipes?"

"In revivifying oxide in the 'off' box without removal, is it best to use steam where it will come into contact with the material, or blow air through without steam?"

"After revivifying oxide, why is water thrown on it before replacing in the box?"

"In making water gas by the cupola system, can 30-candle gas be made as economically as 20?"

"In carbureting gas with oil burned in the retorts, how can the oil supply be regulated to the heats so as to produce the best results?"

"In using iron oxide for purification, the material is found to be charged with naphthaline. How can this be removed?"

"Are there any successful methods for removing the iron from the spent oxide?"

"Are gas companies that own and operate electric light plants satisfied with the profits they are making in this branch of their business?"

"What should be the minimum cost per 1,000 cubic feet for purification of water gas? A factor to be considered is the amount of output, and the charges should include cost of materials—lime, sawdust, shavings or chips, copperas, sal-ammoniac, iron filings, borings, etc., freight and hauling of materials, labor of preparing the oxide and lime, and all subsequent labor in both the purifying and revivifying rooms."

"Is it possible to ignite an explosive mixture of gas and air from a lighted pipe or cigar, without the aid of a flame? Is there on record an instance of this kind?"

"In the manufacture of water gas, which is the cheaper material, crude oil at 2 cents per gallon or gas naphtha at 4 cents?"

It is to be hoped that, when the time arrives, those who can enlighten the querists with regard to the foregoing points will be so good as to impart the desired information.

Your Secretary expected to be able to announce in this issue that the various Passenger Associations had granted the usual concession of one and one-third fares to Detroit and return; but the matter is still pending, and a decision may not be rendered for several days. Of one thing our members can rest assured, and that is that everything possible is being done to secure the reduction. Moreover, if the rate is granted, no time will be lost in mailing to all our members and to those who have made application for membership, the necessary certificates together with the instructions as to how to proceed to secure the reduced fare. Should those interested fail to receive the certificates in question, they will understand that it is simply because the reduction has not been granted.

In accordance with the provisions of Article VII., Section 1, of our by-laws, a meeting of our Board of Directors will be held at the Russell House, on the day preceding the annual meeting of the Association. The Board will therefore convene on Tuesday, May 17, at the hour of 10 A.M., and all of its members are urgently requested to be present. The following is the present composition of the Board :

E. G. Cowdery, Milwaukee, Wis.	I. C. Baxter, Detroit, Mich.
E. H. Jenkins, Columbus, Ga.	Jerome Penn, Washington, O.
W. H. Odiorne, Springfield, Ill.	A. H. Barret, Louisville, Ky.
B. E. Chollar, St. Louis, Mo.	I. S. Post, Chattanooga, Tenn.
A. W. Littleton, Quincy, Ills.	Wm. Wallace, Lafayette, Ind.
K. M. Mitchell, St. Joseph, Mo.	A. S. Miller, Omaha, Neb.
W. J. Johnston, Fort Smith, Ark.	

The list of appointees for the various standing and special committees has been prepared by President Cowdery, but will not be announced until the morning of the first day's session, lest revision might be necessary on account of the absence of some who have been designated for said committee work.

We have heretofore been honored on the occasion of each annual reunion by the presence of a goodly number of visiting brethren from the East. These gentlemen, as they may have discovered ere this, are always welcome, and we trust that they will not only take another pull at the Western's latch-string when we assemble in the lovely City of the Straits, but that they will bring with them many others of the same gracious type of (gas) manhood as themselves. While our Association is "Western" in its name, it is too broad gauged and cosmopolitan in its nature to wish to withhold from others of our fraternity their full share of the pleasure and profit which is to be enjoyed from the 18th to to the 20th days of May, inclusive. From that proud but by no means austere parent, the New England Association, to the young and promising scion, the Southwestern, we extend you one and all, individually and collectively, a hearty greeting. We bid you welcome, gentlemen, and ask you to accept our cordial invitation herewith extended.

A. W. LITTLETON, Secretary.

PROGRESS IN THE MATTER OF THE FAIR FUND.

We regret to say that the subscriptions received during the past week for the erection and equipment of a building for the purpose of showing gas at its best at the coming World's Fair were neither many in number nor large in sum. It may be that the fraternity do not fully appreciate the fact that celerity of response in this matter is most pressing. The opening of the Fair is only a year away from us, and everything in the shape of preparation is yet to be done. We do not for an instant harbor the idea that the gas makers are going to let the gas building go by default, for it is not their rule to fail in obtaining that which they have more than expressed a desire to secure ; but the bald fact is that the subscriptions are coming in very slowly. Awake, gentlemen, to the importance of handing in your subscriptions at once.

[The Gas Industry Council held an adjourned meeting in this city, on the afternoon of last Friday. The session was attended by almost all of the Council members, and the prospect of ultimate success was debated with great force and earnestness. We are informed that the Council have subscriptions to the amount of $40,000, and other sums are in sight that will bring the total sum virtually pledged to almost, if not quite, $55,000. This is not sufficient to warrant them in going ahead ; hence it is necessary, if the work is to be pushed as it should be, that, the designing in detail of the building should be assigned to one of the architects, who have already considered the subject in a preliminary way. The Council believe that if there were *ample* time in which to secure the subscriptions, the needed money would be pledged. But time is important. The building has to be *finished and turned over* to the World's Fair authorities *by October of this year!* It, therefore, becomes necessary for the gas companies and the manufacturers to AT ONCE say whether or not this scheme of an independent gas exhibit shall be brought to a successful issue. We understand that the manufacturers and dealers have not as yet generally come forward. No argument is necessary to show that, if this scheme falls through by reason of apathy, either on the part of the gas makers or the gas works constructors and manufacturers of apparatus, the industry will have reason to deeply regret the failure. In this connection it is to be borne in mind that the gas industry already stands *pledged* to this scheme, and if it falls through the gas men of America will themselves have furnished the argument to sustain the arrogant assertion made to the World's Fair management by the "protected" electric lighting interest, that the gas industry is a "back number." It must also be remembered that the gas makers of Europe are looking to us to furnish an exhibit that will excel anything yet done in this line. Will it not, then, be most humiliating if American gas proprietors must tell their foreign associates that we were unable to get from American gas managers and manufacturers the necessary funds for a matter of such great import to our industry. All feeling of indifference in this matter, respecting the way in which our original application to the World's Fair authorities was treated, should be put aside. They refused ; we persisted. They yielded ; we must carry out our primal purpose.]

The list of additional subscriptions received during the week (up to May 4) is appended :

April 23.	San Bernardino Gas Lt. Co., San Bernardino, Cal.	$25 00
" 23.	Los Angeles Lighting Co., Los Angeles, Cal.....	100 00
" 26.	John Cabot, New York, N. Y.	50 00
" 27.	Milford Gas Lt. Co., Milford, Mass.....	36 00
" 27.	Ann Arbor Gas Co., Ann Arbor, Mich.....	50 00
" 27.	Henry W. Douglas, Ann Arbor, Mich.....	50 00
" 30.	Valparaiso Gas and Elec. Lt Co., Valparaiso, Ind.	20 00
Mar. 14.	The Buffalo Gas Lt. Co., Buffalo, N. Y.....	100 00*
	Total	$431 00
	Previously reported....	35 785 28
	Grand total to date.....	$36,216 28

* On first list but not counted.

THE WESTERN MEETING.

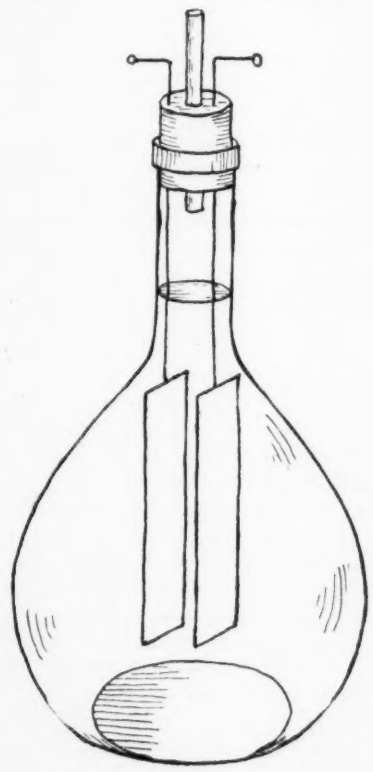
In virtually a week from now the Western Association will be in session at Detroit, and unless all signs fail—of which there is not the slightest possibility—the fifteenth annual gathering is to be a very imposing one indeed. President Cowdery, Secretary Littleton and the local committee have, through their united, persistent and successful application to the preliminary details, so arranged it that the comfort of all is assured. Secretary Littleton's current notice, which should be read carefully, for it contains a great deal of matter that has not been printed before, explains concisely all that has been done so far ; and we would call especial attention to his repeated warning about the good policy of interviewing landlord Chittendon well in advance of the time when his rooms will be needed by the gas men. A very large delegation from the Eastern and Middle States will attend the sessions, and we make no doubt that the home guard will not be lacking in their fealty. The paper list, which is both prolific in numbers and varied in the nature of the topics to be treated of, discloses the fact that "Our sons, their fathers' fading footsteps see," in that branches of the Forstall and Stedman parent trees will speak on subjects that are well away from the beaten track. If any one can handle interestingly the subject of "Petroleum Products," Mr. C. M. Higgins, of this city, is the man. He has been in close communion with the "products" for years, and so has had every opportunity for becoming closely acquainted with them, while in the service of the greatest petroleum factor in the world. Mr. Mitchell, of St. Joe, ought to be able to see a good deal through those spectacles, as he has had a battle with so-called fuel gas for some time back—and still lives. "Ben" Chollar, of course, cannot be other than interesting and witty and wise. Messrs. Bredel and Odiorne have chosen themes that are of weighty import, and we hope the brisk Mr. Bredel will forgive us for hoping that he will eschew the metric system on this occasion. We also welcome Mr. W. Lee Brown to the paper writing list, and his subject is one that will interest large companies as well as small ones. It is possible that Secretary Littleton will not be able to secure the concessions in railway fares obtained during the last few years, but the members may rest assured it will not have been for lack of labor on his part that such a failure was scored.

We are in position to say that the delegates and their guests will be welcomed formally by the Mayor of Detroit. Also, that through the courtesy of the proprietors of the Detroit Pipe and Foundry Company, the Detroit, the Mutual and the Michigan Gas Companies, and the Michigan Ammonia Works, the lady visitors will, on the first day, have a carriage ride to Belle Isle. On the second day the carriage route will be around the city and through the parks ; and on Friday the Association will enjoy a steamboat excursion to and through the St. Clair lake and ship canal, into the St. Clair flats—otherwise known as the Venice of America. A luncheon will be served at the elegant house of the St. Clair Shooting and Fishing Club, and those who are of a sporting turn of mind will have ample opportunity to "cast a line" or "fire a shot." There can be no doubt about it that with fair weather the outing time will be perfect.

A Simple Apparatus to Show the Decomposition and Recomposition of Water.

By E. G. Love.

The apparatus is one I have used for producing electrolytic gas in gas analysis. It consists of a flask of about 200 c. c. capacity, provided with a rubber stopper, through the center of which passes a short glass tube. Two pieces of platinum foil, as large as can be inserted into the flask, are connected with platinum wires which pass through the stopper, and to which the battery wires are to be connected. One of the platinum wires should be so small in size as to be heated to redness by the passage of the electric current; the other wire may be larger.



The flask is nearly filled with dilute sulphuric acid (1–10), a space of about an inch and a half being left between the surface of the acid and the stopper.

On making connection with the battery a brisk evolution of oxygen and hydrogen takes place, which, under ordinary conditions, would escape by the tube. The heating of the platinum wire, however, explodes the mixture, with the production of water, the wire is cooled, more of the mixed gases collect, and so on.

These explosions can be made to occur every two or three seconds, their rapidity depending upon the quantity of the gas produced.

As a battery I have used five Grove cells, of what is usually known as the Tyndall form. Any battery which has sufficient power to decompose the water can be employed, the only essential being to have one of the platinum wires so small as to be heated by the current used.

The introduction of a resistance coil will be found very convenient, as allowing the use of a stronger current than is necessary, and placing the whole in easy control.

The Parkinson Oxygen Process.

The following interesting description of the Parkinson process for the production of oxygen is from a recent number of *Industries:*

More than 20 years ago Tessie du Motay found that oxygen could be cheaply prepared by blowing steam over potassium manganate ($KMnO_4$), the permanganic acid losing part of its oxygen and being reduced to a lower oxide of manganese with the formation of caustic potash; on reheating this mixture in contact with air the lower oxides of manganese absorbed oxygen from the air, and became converted into potassium manganate, and thus by alternate heating in presence of air and blowing steam over the mixture a constant supply of oxygen was produced. After the expenditure of much money by various people this process became disused, chiefly on account of the fact that but little use could be found for pure oxygen after it had been prepared. It was well known that when barium oxide was heated to a dull red heat in presence of air or oxygen, one molecule of the oxide (BaO) took up an atom of oxygen and became converted into barium dioxide (BaO_2), and when the temperature was increased the absorbed atom was expelled and barium oxide again formed. Using these well known reactions, the brothers Brin patented appliances for the preparation of oxygen which are to some extent similar to those used by Mr. Parkinson, an important point in both processes being the elimination of carbonic acid gas from the air by passing it over lime and caustic soda before bringing it in contact with the barium or manganese compounds.

The Parkinson process is a modification of the one patented by Tessie du Motay, and is now being worked by Parkinson's Condensed Gas Company, at Stretford, near Manchester. It is similar in its fundamental principles, in so far as he obtains oxygen by heating or blowing steam over the manganates of permanganates of potash or soda. Mr. Parkinson first separates moisture contained in the air by refrigeration or chemical means. Although this has nothing to do with his process, as the presence of moisture in the air neither aids nor interferes with his chemical reactions or appliances; the important point, however, which would seriously interfere with the former, is the presence of carbon dioxide, always present in very small quantities in the air, and which, as in the Brin process, he removes by passing it over lime, either anhydrous or hydrated, contained in a lime box such as that used at gas works, and then over caustic soda, which would thoroughly remove the carbonic acid. One charge of caustic soda is said to remain good for about six months when in constant use. Parkinson's process is different from du Motay's, inasmuch as Parkinson brings air in contact with his heated manganates under pressure, and removes the oxygen which has been absorbed by the manganates under a vacuum; in this he imitates the processes employed by Messrs. Brin. He does not, however, remove by his present appliances all the oxygen from the air, so that he cannot prepare directly by his process pure nitrogen; this is a matter at present of little importance, as there is little or no commercial use for the pure gas.

The novelty of Parkinson's process, then, depends chiefly on the mechanical appliances for heating his manganates and on the use of pumps and appliances for supplying air to and withdrawing the oxygen from the retorts. Another novelty in the process will be found in the method for bringing the manganates into a porous condition, so that the air may act upon them more easily; this he does by mixing into a plastic mass or paste the ground permanganates of potash or soda with a small quantity (about 15 per cent.) of ordinary porcelain or China clay, or similar inert material. This mixture he puts into small molds about the size of walnuts, and sets them on a series of shelves in a retort resembling an ordinary kitchen boiler. From the center of this is fixed an upright iron rod for the support of the circular shelves, each of which is perforated in the center and fitted with a collar; each shelf, after being filled with the molds containing the clay and permanganate mixture, is lowered into the retort, each sliding over the central spindle in the retort. When full, heat being applied at the bottom and round it by means of gaseous fuel, an air tight lid is firmly fastened on and a pipe is taken from this retort to the vacuum pump. The mixture is thus dried at a gentle heat at first, and then heated to a high temperature, the contents of the molds being left in a porous condition by reason, first, of the water gradually drying off from the China clay and permanganate mixture, and afterward by the escape of the oxygen from the mixture.

For the manufacture of oxygen the patentee fills retorts resembling U-tubes. The U-tube is, however, produced by dividing a long, flattened cast iron tube into two equal parts by a metal plate, which extends nearly to the bottom. Another tube is passed through each leg of the U-tube thus formed, through which the flame and flue gases from the furnace pass for the purpose of more rapidly heating the contents; the oxygen producing mixture is thus contained in the annular space between the flue tubes and the leg to the U-tube. Into this annular space also project from the flue tube pieces of metal, which act as trays for the support of the permanganate mixture, and which serve for conducting the heat from the flue tubes to the manganate mixture. Three of these U-tube retorts are required for each oxygen producing set; the first is employed for simply heating the air under pressure before it is allowed to escape into one or other of the two U-tubes set side by side with it. The whole apparatus is fixed into and upon a circular iron drum, about 10 feet high and about 10 feet diameter, the engine and pumps and other machinery being set on the top of this drum; the heads of the retorts are seen on the top, and they are suspended from it by girders passing across it, and thus hang into the furnace contained in the iron cylinder below.

The objects of the plant used are to arrange, first, that air at a pressure of about 10 lbs. per square inch shall act upon the manganate mixture in one of the retorts for two minutes; second, after the time

that the pressure shall be removed and the hot air, which consists chiefly of nitrogen—the oxygen having been largely removed by the manganate mixture—shall be passed below appliances with the view of utilizing the heat it contains by giving up a large portion of it to the air or gas used in the combustion chambers below; third, that, simultaneously with allowing the compressed air to escape a valve should be opened in the furnace, which allows the flame to play upon the outside of that retort, and on the inside of the two flue tubes, which penetrate the two legs of each retort, while it simultaneously closes valves, supplying the other retort with gaseous fuel—the one retort being thus allowed to cool down as air is being forced into it, while the other retort—which is being simultaneously exhausted of its gaseous contents—during two minutes is being heated up to assist the vacuum pumps in removing the oxygen from the manganate mixture.

It is obvious that, after the pressure has been removed, and the hot nitrogen left in the retort allowed to escape, there will still remain in the retort a considerable quantity of nitrogen, which must be removed before the liberated gas can be regarded as satisfactorily pure oxygen. This is achieved by a valve fixed on the top of each retort, consisting of piston, which is held up by a spring. In this position it has opened a valve which allows the gas pumped from the retort by the vacuum pump o pass away into the air, and the spring is so adjusted that it keeps open his exit or the air until the pressure in the retort is equal to a barome-ic pressure of 25 inches, when the weight of the atmosphere on the top of the piston pushes it down against the spring, and this is connected with another valve, which it opens as the piston descends, thus opening communications with a pipe leading to the gasholder, and allowing the gas, which consists of almost pure oxygen, being passed to the gasholder. When the air under pressure from the heating retort is again passed into this retort, the pressure of the gas and the spring pushes up the piston, opening the valve, which puts it into communication with the tube leading through the vacuum pump to the open air, again to be pushed down so as to put the gas in the retort into communication with the gasholder when the air inside has been removed to a sufficient extent.

There are two force pumps and one vacuum pump worked from the same crankshaft. The first pulls the air through the lime in the lime box, and passes it on to the second force pump, which compresses it, passing it through two cylinders filled with lumps of solid caustic soda. This is for the purpose of removing any trace of carbonic acid which might yet remain in the air, and also for the purpose of removing any trace of oily matters which it might have carried from the pumps, because if any trace of oil were carried over into the retorts it would be turned into carbonic acid and water, the former of which would gradually destroy the oxygen producing qualities of the manganate mixture. From these caustic soda vessels the air passes on to the heating retorts and is there compressed. A ratchet wheel connected with the piston of the engine which works the pumps reverses the connections with the two retorts and places them alternately every two minutes in connection with the heating retort, from which it receives the compressed air, and with the vacuum pump, the same piston also working simultaneously; the valves in the gas furnace below allow the two retorts to be heated and cooled alternately every two minutes. There is a Siemens gas producing furnace inside the large iron drum which is fed with coke by a hopper from the outside, the water vapor being supplied from a large pan placed under the producer.

Our illustration, Fig. 2, shows a half sectional elevation of the heating retort in the center surrounded by two pairs of retorts containing the manganate mixture. In this arrangement, which is the same as that worked at present by the company at their works in Stretford, two retorts are charged from the same heating retort, but by two sets of compressing pumps, and two exhausted by two sets of vacuum pumps alternately. The whole is of cast iron in one piece; the one-half of the retort is shown in section; the projecting pieces of iron F^1 are arranged spirally both inside the retort itself and inside the flue pipe, and are for the purpose of strengthening the retort and conducting the heat from the flue to the manganate mixture in the retort. The position of these retorts is shown in plan in Fig. 1. There are five retorts one being in the center for superheating the air before it passes into the two retorts marked D, on the one side, or into the two marked D^1, on the other. The air enters the apparatus in the direction shown by the line (1), which shows the pipe leading to the force pumps from the lime chamber, along which the purified air flows; arriving at the force pump it is compressed and returned to the soda purifier, after passing through which it returns by the pipe 3 to the jackets surrounding the force pumps; it thus cools the pumps, and the heat produced by the compression is also utilized. From the jacket it passes along pipes 4 to the superheater, where it is compressed. The "nitrogen relief valve" shown in Fig. 1 is practically a safety valve weighted to about 5-lb. pressure, from which the air escapes if the pressure rises above that required, and air more or less exhausted of its oxygen is constantly escaping from this valve. The dotted lines and straight lines joining the two retorts on either side of the superheater show the position of vacuum and pressure in each pair respectively, the valves which reverse the vacuum and pressure being worked by the engine on the top of the cylinder or drum.

Lastly, an ingenious piece of apparatus is that shown in Fig. 3 for separating, automatically, the residual air in the retorts before the oxygen is sufficiently pure to be allowed to pass on to the gas holder. The apparatus is shown in the illustration in the position it would take. When there is a vacuum in the retorts equivalent to an indication of 25 in. barometric pressure, the piston A being forced down against the pushing up action of the steel spring U by the pressure of the outside air, the tube B is connected with the vacuum tube or tube leading from the retort to the vacuum pump, the tube F with the tube leading *from* the vacuum pump to the gas holder. When the valves are reversed by the machinery so as to allow the air under pressure in one set of retorts to escape, the vacuum is destroyed in the tube B, and the piston A is pushed up, thus closing the valve E and opening the valve D on the spindle above it, the air then from the vacuum pump escapes directly by the valve at D into the atmosphere; as the vacuum approaches an

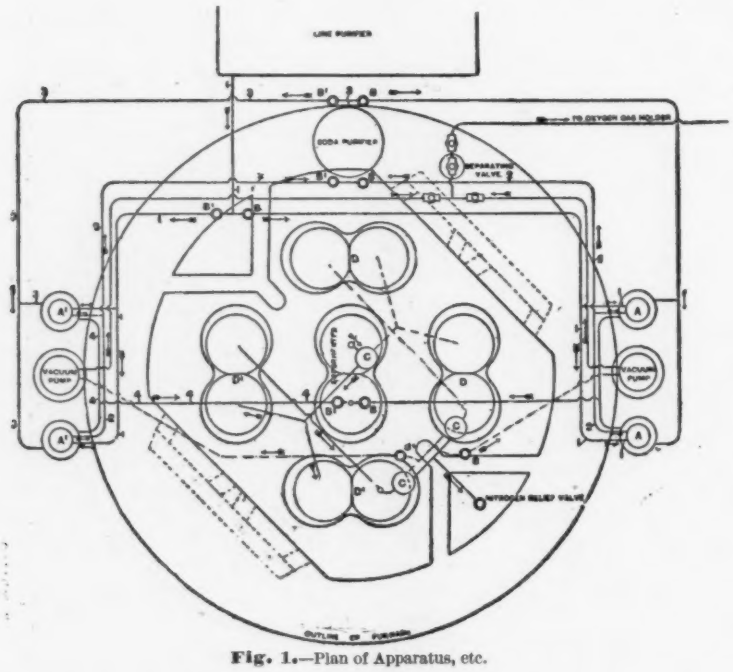


Fig. 1.—Plan of Apparatus, etc.

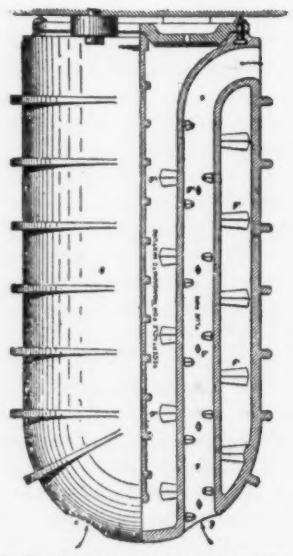


Fig. 2.—Retort, Semi-Section Elevation.

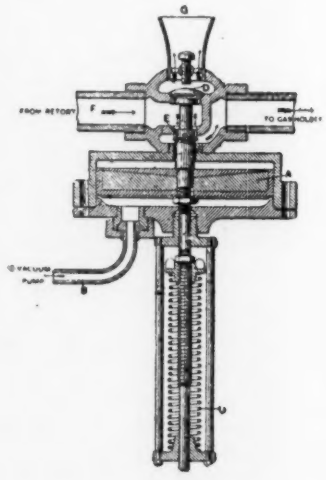


Fig. 3.—Air Liberating Device.

indication of 25 inches the pressure of the air on the piston *A* pushes it down and closes the top valve, and simultaneously opens the valve which directs the oxygen on to the gas holder.

The Siemens furnace is situated at a position nearly below the "nitrogen valve," and the gas and air are directed alternately to one side and the other by dampers altered every half hour. By this means the brickwork through which the gases pass becomes heated to bright redness, and when the current of the gas is reversed the bricks on the other side (shown in Fig. 2 by dotted lines) become heated to bright redness, the air required for combustion being heated by passing through the red-hot brickwork on the side opposite to that at which the combustion is taking place, the flame passing through a series of holes in the brickwork into the heating chamber, into which the retorts are suspended, and passing away by the flue tubes which pass through the legs of each retort.

The oxygen produced is said to contain from 98 to 100 per cent. of pure oxygen, and to cost from 25 cents to 37½ cents per 1,000 cu. ft. Two retorts, working with 1 ton of coke per day and 1 set of pumps, are said to produce 7,500 cu. ft. of oxygen, measured at the ordinary temperature and pressure, while, with 2 sets of pumps and retorts, with the same attendance and a small amount more fuel, 12,000 cu. ft. per day are calculated to be produced. Skilled attendance is not required, and the apparatus works with remarkable smoothness.

The Supply of Gas by Prepayment Meters, or Short Period Collections.

At the semi-annual meeting of the Southwest of England District Association of Gas Managers—of which body Mr. Norton H. Humphrys, our Special English Correspondent, is Honorary Secretary and Treasurer—a very interesting discussion on the above-named subject was had. Mr. G. J. Gough (Calne) commenced the discussion by remarking:

The notice on the *agenda* paper states that I am to open a discussion on the supply of gas by prepayment meters, or short period collections, as a means of increasing consumption. That is not quite what I proposed to do, but to bring under discussion the question simply of facilitating the more general use of gas by providing and laying service-pipes and fittings in small houses. Perhaps the Committee wished to have the subject of increasing consumption discussed in its wider bearings; and therefore so formulated the notice. Nevertheless, I shall be pleased to offer a few remarks on prepayment and short-period collections; but what I am particularly anxious to have discussed is the initial question of getting gas installed in small houses. At Calne we are in this position: Practically all the houses above £10 rental are supplied with gas; but of those under that rental and within reach of our mains, not more than about one-third are supplied. It was quite independently of the fact that other companies had introduced the system of laying on services and fittings that I made the suggestion to my directors that they should undertake it; for I was not then aware it had been tried. The course was suggested to me solely by our own circumstances; and my directors at once decided to take up the question, and they hope shortly to put the plan into operation. Upon making inquiries, I found that Mr. Valon had adopted it at Ramsgate, in connection with his prepayment system. With the reasons why so large a proportion of these small houses are not supplied, perhaps we are not concerned to inquire here. Probably the chief reason is that the builders or owners have shirked the cost of laying on the services; but at any rate, under the existing circumstances, without the application of some such means as those suggested, the occupiers of these small houses are practically denied the use of gas. I have had no experience with prepayment meters; but I am strongly of opinion that they would not answer in small towns, either as a means of collection purely, or used with the view of increasing consumption. I think the consumers would object to them, unless, perhaps, a strong inducement to their use was held out in the shape of a substantial discount for the prepayment, which I imagine it would not be possible to offer, and that instead of their use operating to produce a larger consumption, or a more general employment of gas, they would act as a check. The landlord has to trust for his rent, the tradesman for his goods supplied, and I think gas companies must also be prepared to trust for their gas to a reasonable extent. A reasonably short-period collection should certainly be adopted; and, the collection being then well attended to, there would not be much cause for complaint on the ground of bad debts. At Calne, we collect our accounts quarterly, and our bad debts, speaking particularly as to the small consumers, are almost *nil*. Whether we should find it more advantageous to adopt a shorter period collection in the case of small householders and cottagers—say a monthly collection—I incline to think we should. The amounts to be collected would be smaller, and perhaps more readily paid, and probably there would be more gas consumed and less grumbling. I should like to hear expressions of opinion upon this point. The simple proposals I am suggesting to my directors for adoption just at present, are the following: That they shall, with the consent of the landlord, and by the wish of the tenant, provide and lay on internal service pipes, and also brackets or pendants (unless the tenants should determine to provide them themselves), and charge a permanent annual rent for their use; the consumers to keep them in repair, but the company to make the renewals when required. I propose to lay the fittings on the ground floor only; and in my case, the average requirements would be about as follows: Fifteen yards of ½-inch composition pipe, ½-inch meter tap, a pendant for the front room, a bracket for the kitchen, and provision for a boiling stove. The cost of this would average under £1. I would charge a rental equivalent to 10 per cent. on this sum, which would be equal to 6d. per quarter, or 2d. per month, with a monthly collection. The landlord or tenant is to be at liberty to purchase the fittings at any time at their value. Under this plan there would be no complication upon a change of tenancy. If the consumer should discontinue using gas, or if an incoming tenant should not require it, the connection would be cut off and the internal service pipe left for possible future use. In my case the company would probably supply the fittings and their servants do the work; but the work ought to be given to tradesmen if preferred. I cannot help thinking but that we shall find a large number of small householders willing to accept these terms; and if this should be found to be so, our object will be gained. I shall be glad to hear your criticisms and opinions; but I wish you to bear in mind that the remarks I have made only apply to small towns.

Mr. Valon said he thought the proposition put forward by Mr. Gough was quite sound. Of course he could fairly well recognize that in such a town as Calne, the gas manager would know everybody, and in such a case the risk of bad debts was reduced to a low point. There were some small places under his own supervision where he thought that would apply; but when they came to towns like Ramsgate, then it was not so safe. In the first instance, before the prepayment meters were adopted there, they tried to get on with the ordinary meter, and they fixed something like 120. But the difficulty was to get small householders to understand how much gas they might or might not burn; and for that class of people they did consume considerable quantities of gas, and this led to disputes. They then introduced a meter by which a certain amount of gas could be used by these consumers and no more; and, except in a few instances, where they had miscalculated, they had had no disputes since. The whole of the original meters fixed without a stop had been taken away. The meter was really only an ordinary one with a stop on the index, so that, when an arrangement was made to burn 1s. or 1s. 6d. worth of gas, the stop was put forward to that point; and when the hand arrived there it stopped. In the meantime, if the consumer burned that quantity of gas, he had to apply to the gas offices for a further supply. They found in Ramsgate that they had reached very nearly the end of their extending power as far as the consumption of gas was concerned (except they depended entirely upon gas stoves and so on) unless they went into some scheme such as was now under discussion. They had at present from 600 to 700 consumers who lived in houses at a rateable value of from £10 to £30 a year; and these people would otherwise never have been consumers at all, for the reason that they could not afford the first expense of fitting up their houses. The corporation charged them 4½d. per 100 cubic feet of gas, or 3s. 9d. per 1,000 feet; being 7d. more than the ordinary consumers paid. Putting the 7d. on one side, they found this would be sufficient to wipe out the cost of the fittings in five years; so at the end of that time the outlay for the installation would be free. Supposing the difficulty arose, as he thought was foreshadowed by Mr. Gough, that someone took one of the houses that had been fitted up for the previous tenant and did not want gas, they had no alternative but to leave the fittings there; but they made an arrangement with the landlord by which the fittings remained the property of the corporation. In a case where a new tenant came in who had been a consumer under the old system, he could, if he chose, go on paying as formerly. He was sure that, if the success at Ramsgate followed the adoption of the system in other towns, the gas managers would be pleased they had taken it up.

Mr. A. V. Daniel (Portishead) asked whether anyone present had tried the automatic meter, in which, instead of the attendance of an official of the gas company being required to turn on the quantity of gas paid for, the consumer could get a supply by dropping in a coin.

He knew that such meters had been in use at Clevedon; but he believed they had not been very successful there.

Mr. W. Cheyne (Briton Ferry) remarked that he had tried both the shilling-in-the-slot and the penny-in-the-slot meters; and he had found them a perfect success. The meters he had used were made by two different makers.

Mr. H. Sainsbury (Trowbridge) said he had had some experience with small consumers in Trowbridge. They had a large number of working people there, and many were consumers, although the gas was sold at 3s. 4d. per 1,000 cubic feet. Many of the bad debts they had were among the tradesmen, and not among the poorer class of people. With regard to laying the service pipes to small houses when they were being erected, some cottages had lately been built at Trowbridge, and the landlords had put in the pipes and the gas company the service pipes. In a range of eight or ten cottages, however, they found they did not get perhaps a couple of consumers.

Mr. N. H. Humphrys said that in this question of extending the use of gas there was a tendency to run too much in one rut, so to speak. In almost every town there were different circumstances, and the best thing was for the gas manager to look round quietly and see what would suit the fancies—he might almost say the eccentricities—of the consumers they had to deal with. Some 30 or 40 years ago, a customer sometimes had to go to the gas works three or four times before he could get a service pipe at all; and to lay 20 yards of pipe free was thought simply ridiculous. But this was changed now. The service pipe was laid free, and some of them even went further, if they saw a chance of securing a regular customer, and did not object to a little additional expenditure. But it seemed to him that, while discussions of this sort as to the general principles to be adopted were very beneficial, they must go somewhat further themselves when they got home and must look round their own district, and do the best they could for the different classes of people they had to deal with.

Mr. Durkin said that he quite agreed that each manager must be guided by the circumstances in his own particular locality. He had an instance where a new district in his neighborhood was built upon. The builders introduced gas pipes into the houses, and he was very liberal in laying the services without any expense to them. By-and-bye he found that no gas was being used, so he left off laying the services; for he thought it was a very improper thing to have a lot of pipes in the ground and run the risk of getting them broken and have leakages and so on. He very much upset one builder because he would not put a service pipe into a house that was partly erected. He said he would wait until it was occupied; and he found that he had done right, for the tenants had not yet applied for a supply of gas.

Mr. J. Nicholls (Crewkerne) observed that he had fitted up 20 cottages with a bracket in one bedroom, a pendant in the front room and a bracket in the kitchen. The cost to the company was about £1 for each cottage; but up to the present they had only one consumer out of these houses.

Mr. T. W. R. White said that he found the penny-in-the slot meter worked very nicely. The great advantage was this—that with the prepayment meter, the consumer could get the gas as he wanted it; he paid for it as he went along; and was not troubled with an account at the end of the quarter. In one instance where they had a prepayment meter, to their surprise the first quarter, the consumer used 14s. worth of gas; and in the second quarter (in the meantime they had had a little cooking stove fixed), the company collected £1 5s. 7d. Later on, in one quarter the box became so full of coppers that the consumer was obliged to send to the gas works for someone to go and empty it. Unfortunately he could not get any more meters just now, and so was at a standstill.

The President said his experience coincided with that expressed by one of the speakers, that the poorer consumers were the best payers, and he believed this was so in Bristol—at all events it was his experience in the north. But in poor districts they did not generally use gas; they preferred oil. The gas companies supplied what they considered was a safer, better and cheaper light. What, then, were the obstacles in the way of the extension of their business in this direction? Undoubtedly it was the quarterly account—the uncertainty of that account. If they could by any means have an arrangement whereby the consumers could pay for the gas as they used it, he was sure there was a wide field for extension. There were, however, two or three things required. First, the meter must be reliable; and secondly, every facility should be given for furnishing the fittings something after the plan adopted by Mr. Valon. The extension of gas in the poorer districts in opposition to the use of oil was a subject which demanded, and ought to have, the close attention of every gas manager.

Mr. Gough said he should have liked to have heard the opinion of other gentlemen who had put some such scheme as he proposed into practice. The experiences of the gentlemen who had spoken had been widely divergent. While one speaker found in a row of houses fitted up with pipes that the tenants would not consume gas, another had consumers who were only too anxious to use more gas before they could get it. There was a great field open for the sale of gas among the working class. They had had difficulties in the way which had prevented a more general use of gas in the past; and it was the duty of gas managers to remove those and to do all in their power to increase the consumption. In opening the discussion, he omitted to mention a distinction between his plan and that in operation at Ramsgate as to payment for the fittings. He had suggested a fixed average rental—a percentage upon the outlay; while at Ramsgate, he believed it was fixed upon the consumption. He should like to know whether Mr. Valon saw any objection to his proposal. At Ramsgate, with an increasing consumption they had an increasing payment for the fittings; and he rather feared that, instead of assisting in extending the consumption, this would tend to prevent it.

Mr. Valon said there was no great variation in the consumption in the class of houses they supplied under his plan. The average consumption last year, as far as he remembered, was 13,000 cubic feet per house—he believed it varied from 11,000 to 14,000 cubic feet. Of course the larger houses consumed a little more gas; but their fittings were rather more expensive. He had no doubt, however, that it would work hardly in one or two cases. The average cost of fitting up the houses was something like £4. He had not found any objection to his system up to the present; but he quite agreed that a percentage on the outlay might be the most equitable way of charging for the fittings.

Mr. T. Hardick (Salisbury) remarked that each one would have to take his own course in this matter. At the present time there were very few cottagers who could afford to burn gas. At Salisbury, they had gone on very quietly; but they never sold as much as 14,000 cubic feet of gas in a year to cottagers. If they reached 1,500 or 2,000 feet, it was as much as they could do. The houses of £30 and £40 rental never had a consumption of more than 10,000 cubic feet per annum. Mr. Humphrys had just issued in Salisbury a circular on the subject of gas for cooking and heating purposes, in which he stated that they had some 500 gas stoves now in regular use. He also spoke about the advantages of gas as a fuel; and then proceeded to mention that at Salisbury they were among the first to offer their customers the advantage of gas stoves on hire. For the last 30 years they had supplied them at a rental of 2s. per quarter upwards, according to size; and, as the result of experience gained during that period, they were able to send out stoves that would be sure to give satisfaction, if used with reasonable care. If not more than 40 feet of pipe was required, the stoves were fixed free of cost. Mr. Humphrys had exercised himself, and now they had also more than 100 high power lamps in use in the city. For these they received a rental of 2s. 6d. or more, according to price and size. The stoves returned at least 11 per cent.; so that they were a far better investment than Consols.

Improved Method of Constructing Inclined Retorts.

Messrs. Andrew Coze and Alex. Lencauchez, of Paris, France, were, on April 19th, granted U. S. Letters Patent (No. 473,145) for improvements in the construction of inclined retorts, and they subsequently assigned the same to Messrs. Socrates Newman and James Green, of St. Louis. Using the words of the specification, the inventors remark:

The objects of our invention are to insure a regular distribution of coal along the bottom of an inclined gas retort and to facilitate the disengagement of gases from the coal, and also to improve the construction of gas retorts and the setting of the charging chutes for the same.

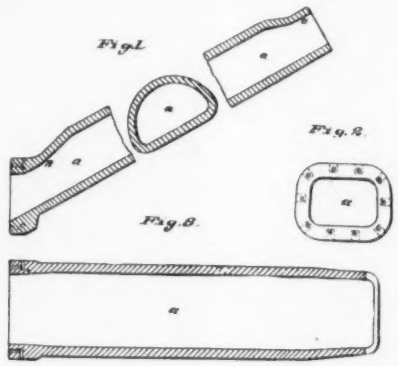
The invention will be best understood by referring to the accompanying drawings, in which—

Figure 1 shows a vertical, longitudinal section and a transverse section at right angles to the axis of an inclined gas retort made in accordance with our invention. Fig. 2 is a front end elevation of said retort. Fig. 3 is a longitudinal section of the same through the axis of the retort taken on a plane at right angles to a plane perpendicular to the axis. Fig. 4 is a vertical section of a gas retort bench provided with our improvements, taken on a plane through the axis of the retorts. Fig. 5 is a transverse section of the latter on the lines 5 5 of Fig. 4, one-half thereof being on one of the lines 5 5 of Fig. 4 and the other half on the other line 5 5 of said figure.

The same letters of reference indicate the same parts throughout the several views.

The retort *a* is set at such inclination—that is, at the angle of repose,

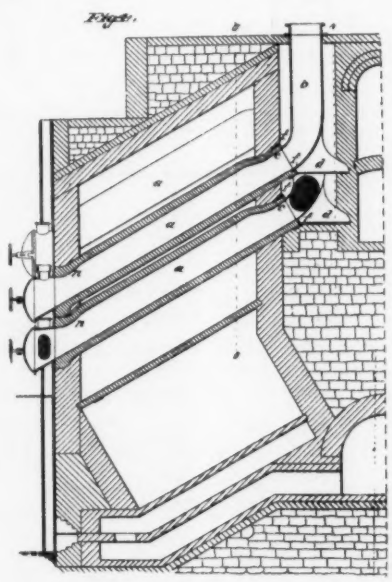
which in the example shown is represented as 29 degrees, but which may vary according to the nature and smoothness of the retort, the size of the lumps of coal, etc.—and is made of such form in cross section as will insure a regular distribution of the coal throughout its length and is contracted in depth on top and in breadth at its mouth *c*, where it passes through the brickwork setting and fits in the bend of the charging mouth *b*, of which it forms a prolongation. The retort is preferably also slightly contracted in a similar way at the discharging end at *n*. The part of the retort intermediate of its ends and comprised between the front and back walls of the oven is thus of larger cross sectional area than its upper end, by which means the disengagement of the gases is greatly facilitated, while the coal, by gravitating downward toward the mouth of the chute, is distributed in a regular manner throughout



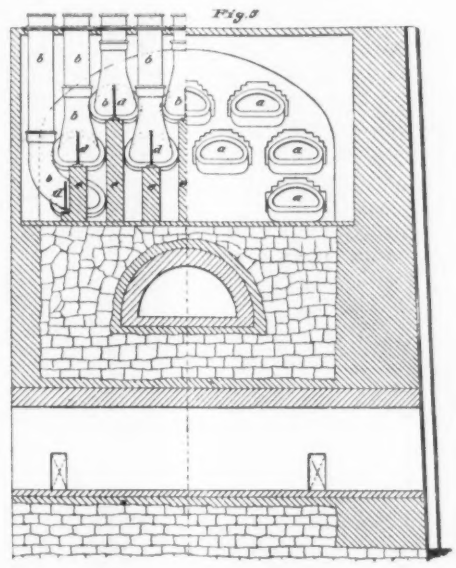
the length of the retort and choking of the retort at the upper end is prevented

The contraction of the lower end of the retort is produced by giving to the upper retort wall a substantially horizontal bend at the place where it passes through the brickwork of the front wall of the oven. Upon the horizontal support thus afforded rests the corresponding projection *m* from the lower wall of the upper retorts. By this arrangement the lower ends of the retorts receive firm support, one from the other, and the lowermost retorts being provided with like projections *m* the weight of the superposed retorts is transmitted in substantially a vertical direc tion through the front wall of the oven, thereby relieving the very considerable strain that would otherwise be exerted to force said wall outwardly. It will be noted, moreover, that this result is attained without increasing the distances between the retorts or the retort mouths.

Figs. 4 and 5 show the improved method of constructing the charging



mouths or chutes *b*. Each of these chutes *b* is provided with a socket *f*, fitted, as shown, over the mouth of the retorts, *a*, which can thus terminate in a plane perpendicular to the axis of the retorts. The joint between the sockets of the chutes and the retorts is provided with suitable packing, preferably of sand, to make the same tight. The advantage of such an arrangement as the foregoing, both in respect to the manufacture of the retorts, as well as to the preservation of the joint, will be evident, if it be considered that were the cast iron bend bolted to the flange of the retort the latter being inclined would necessarily present an oblique angle. According to this improved arrangement, each bend is formed with a rib or flange *d*, as shown, forming a sole piece, which is supported upon piers *e* in the setting or otherwise, so that all strain upon the joint is prevented, and the joints are consequently more easily made and kept in good condition. The charging mouths *b*, as also the retorts *a* themselves, are suitably isolated from the setting, in order to avoid the effects of expansion and contraction.



Having fully described our improvements and explained their advantages, what we desire to claim and secure by Letters Patent of the United States as our invention is—

1. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated, said inclined retorts being contracted at their ends, substantially as and for the purpose desribed.

2. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated, said inclined retorts being substantially semicircular in cross section and contracted at their ends, substantially as and for the purpose described.

3. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated, said inclined retorts being substantially semicircular in cross section and contracted at their upper ends for the purpose described, in combination with charging chutes, the charging mouths of the chutes being constructed to fit upon the contracted mouths of the retorts outside of the setting.

4. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated, said inclined retorts being contracted at their upper ends for the purpose described, in combination with charging chutes, said chutes having their mouths constructed to fit upon the contracted ends of said retorts and provided with sole pieces and supports for said sole pieces.

5. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated, said inclined retorts being contracted at their upper ends for the purpose described, in combination with charging chutes, said chutes having their mouths provided with sockets constructed to fit over the ends of the retorts, and a suitable packing (preferably of sand) between the sockets and retort ends.

6. A gas retort bench provided with gas retorts arranged at the angle of repose for the materials treated, said inclined retorts being contracted at their upper ends, in combination with charging chutes constructed to fit upon the contracted ends of the inclined retorts, the planes of the joints being at right angles to the longitudinal axes of the retorts, substantially as described.

7. A gas retort bench provided with gas retorts arranged at the angle of repose for the material treated and contracted at their upper charging ends, whereby the entering coal will arrange itself in layers parallel to the floors of the retorts, but separated from the tops of the retorts by an increased gas space, and whereby clogging is prevented, substantially as described.

Asphalt in India Rubber Compounds.

From the beginning of the rubber business manufacturers have appreciated the use of asphalt and tar in a variety of rubber compounds. Especially has this been true in goods cured in what is known as the dry heat. Boots and shoes, clothing and insulated wire compounds to-day all have a certain percentage of what is known as tar, but which is usually purified asphalt. The common belief that the goods are injured

by the addition of this substance is wholly erroneous; a certain amount of asphalt compounded with rubber assists in calendering and during vulcanization imparts a certain toughness to the rubber which is not to be gained in any other way. The proportion used to-day is but small. For example, what would be known as a rich compound is 18 pounds coarse Para, 11 pounds litharge, 40 pounds whiting, 3 pounds asphalt, ½ pound lampblack, 11½ ounces sulphur. Exactly what asphalt is very few people seem to know, and it is almost invariably in the popular mind confused with coal tar. Asphalt as a paving material has been known since the Babylonian empire, and to-day paving blocks are found that preserve their integrity and have hardly begun to oxidize in spite of the atmospheric changes to which they have been exposed. It is only within late years that asphalt has been well known in the United States. It looks very much like pitch, and when ignited burns with a bright flame, giving off a dense black smoke. Alcohol, ether, oil of turpentine, naphtha and many other reagents easily dissolve it. Its specific gravity is 2.23.

Until very recently all the real asphalt used in this country was imported. There is in the island of Trinidad a lake nearly two miles in circumference which is the source of the most of it, and it is said that near the shore the asphalt is very hard, but out in the center it is soft and viscid. When imported to the United States it comes mixed with sand and gravel and a variety of foreign materials, from which it is separated by heating over a slow fire for a week or more. During this heating process the impurities of a lighter nature rise to the top and are skimmed off, while the heavier substances settle to the bottom of the receptacle. There are very large deposits of asphalt in France and Switzerland, and within the last three years quite extensive deposits have been discovered in Utah and California, and small ones in Kentucky. For paving streets it is prepared by grinding first to a powder and mixed with crude petroleum and fine sand. It is then moulded into blocks of suitable size, or sometimes it is poured between blocks of paving stones, when it becomes hard, and greatly resembles the natural rock.

Another use for asphalt is in the manufacture of black varnish, where it is dissolved in oil of turpentine and linseed oil and makes an exceedingly durable coating. For insulating electric wires this sort of coating has been found of great use, and it is said that one of the best rubbers for wires to-day manufactured is made of a fine compound containing 30 per cent. of India rubber, the compound after semi-vulcanization being dipped in boiling asphalt, which toughens it exceedingly. As asphalt is not affected by acids or gases, and is an absolutely waterproof compound, and as heat and cold do not affect it, it is a valuable article to use in connection with India rubber, although if too large quantities of it are put in it shortens the gum and may during the process of vulcanization cause it to blister. A great deal of the gum roofing sold in the United States which is thought to be India rubber or gutta percha is made simply from a solution of asphalt spread upon prepared paper.

[A Paper read before the Society of Gas Lighting.]

Some Speculations on a Patent Gas Process at Newark, N. J.

By Mr. A. H. Strecker.

Not having had sufficient time to prepare a paper, as I had it in my mind's eye, to be read before this Society, and yet not wishing to fail altogether in my duty, I beg to present instead a little sketch upon a topic which has suggested itself to me within the last few days.

A certain party having selected our town in which to demonstrate the merits and advantages of a new process of gas manufacture, and having to this end set up an experimental apparatus, I was asked to go and see what was to be seen. The promotors, of course, are anxious to sell rights to use their process to private individuals or established gas companies upon favorable terms—first comers to enter upon the ground floor.

I found a small bench about 5 feet long, 3 feet wide and 6 feet high, containing five cast iron retorts, of about 5 inches diameter, connected together at their ends. The roof of the furnace was formed by a small horizontal boiler which generated the steam necessary to carry on operations.

Crude oil was allowed to flow in small streams into the rear ends of the two bottom retorts, where, at the same time, a current of air was drawn in by a jet of steam. The whole mixture, oil, air and steam, flowed through all the retorts successively, and then to a wash box or seal tank, and then to the holder. An apparatus like this in actual operation at some place in Canada was stated to produce 1,000 cubic feet of 18 to 20-candle gas per hour, using 4½ gallons of crude oil and 38 lbs. of anthracite coal—the latter for fuel only.

The specific gravity of the gas was said to be between 0.900 and 1.000. The parties in charge could not furnish an analysis of the gas.

Allowing a yield of 80 cubic feet per gallon of oil used, the gas would seem to be composed of about 36 per cent. of oil gas and 64 per cent. of air.

The steam which is injected seems to have no other effect than to draw in the air. The heat of the retorts is entirely too low to decompose it in the presence of the carbon contained in the oil. Should the heat in any part of the retorts be sufficiently high, the large admission of air would cause partial combustion of the gas.

The parties in charge of the apparatus and process claimed many advantages for it, among which were its cheapness, low cost of gas produced, easy handling etc., etc. Beyond these ordinary claims they further insisted that their gas was absolutely non-explosive and non-poisonous, and in support thereof gave instances of persons having slept for hours in rooms which had been filled with their gas from a number of unlighted jets, and, upon awakening, having walked forth feeling better and hungrier than ever before in their respective lives; and that then, light was brought into the rooms without producing any explosion. Their gas was also praised as a perfect cure for catarrh.

I think this was about the sum and substance of the claims of the patentees.

The process, of course, as you will readily see, is only one of the variations which have been played upon the theme of oil, air and steam from the time of Gale & Rand down to the present day. The apparatus is in many features like the one which has been fathered by Gen. Beauharnais, being exhibited on Staten Island some years ago, and which is now seeking admittance in New Bedford.

Upon leaving the place of exhibition, the Manager pressed me for an opinion on the value of the process. Not desiring to sit down too hard upon his scheme, or waste time attacking some of their absurd claims, and yet being equally unwilling to appear to like it, I just hinted to him that there was, right at the start, one serious objection to the use of his process by gas companies, irrespective of its other merits or faults, and that was the specific gravity of that gas. The same is nearly that of air, more than twice that of coal gas, and nearly 50 per cent. more than that of rich water gas. To overcome this great density, and to deliver to the consumers the same volume of gas as before, it would be necessary to either greatly increase the initial pressure at the works, which is not feasible in many instances, or to increase the capacity of the pipe system, which is very expensive. This objection seemed to rather annoy the gentleman, and I am afraid that he did not like me nearly as much when I went out as when I came in.

Upon my way home I kept on speculating upon what effect such a great change in specific gravity would have upon a distributing system, and I figured out, for my own satisfaction, the result.

As to the volume of the heavier gas which would be delivered under the old conditions we have the general rule that volumes of gases of different specific gravities are inversely proportionate to the square roots of these gravities.

Now, if coal gas has the specific gravity $g = 0.420$, and the gas in question that of $g_1 = 0.950$, then the volumes, V of the lighter, and V_1 of the heavier gas, are as

$$\frac{V}{V_1} = \frac{\sqrt{g_1}}{\sqrt{g}}; \text{ and } V_1 = V \times \frac{\sqrt{g}}{\sqrt{g_1}}$$

Or, by substituting the above values of g and g_1, and figuring out the equation, we find

$$V_1 = 0.66\,V.$$

In other words, if the sendout of light gas had been 1,000,000 cubic feet, that of the heavy gas would amount to only 660,000 cubic feet. The consumers would save 33 per cent. on gas bills, but they could realize this saving only if the heavy gas had corresponingly 33 per cent. more illuminating power, or 24 candles when the coal gas showed 18. Should this not be the case, then the consumers would suffer from insufficient light; they could not help themselves by substituting larger burners, since the general introduction of such would tend to still further lessen the resultant pressure, and produce wavering and smoky flames. We may say, therefore, in a general way, that the introduction of a heavier gas without changes in the initial pressure, and not attended by a corresponding rise in the illuminating power, will result in a diminished output and in general and well-founded complaints about insufficient supply, or bad gas, as the consumer generally styles it.

If we now desire to send out as much of the heavy gas as we did formerly of the light one, by augmenting the initial pressure, we have the rule that the pressure required, P_1, is to the former pressure, P, as

the square of the original volume, V, is to the square of the diminished volume, V_1, and, consequently,

$$P_1 = P \times \frac{V^2}{V_1^2};$$

and by substituting for V and V_1 their values of 1 and 0.66, respectively, we find

$$P_1 = 2.29 \times P.$$

If, for instance, 2 inches had been the pressure required to send out 1,000,000 cubic feet of the light gas, it would take 4.58 inches to send out the same volume of the heavy gas.

And if it is desired to find what increase of diameter of the pipes constituting the distributing system is necessary to accommodate the greater density, without increasing the initial pressure, we find that the diameter, d, of the pipes sufficient for the lighter gas, to the diameter, d_1, of the pipes for the heavier gas, is as the fifth root of the square of the full volume, V, to the fifth root of the square of the diminished volume, V_1; and, therefore,

$$d_1 = d \times \frac{\sqrt[5]{V^2}}{\sqrt[5]{V_1^2}}$$

Substituting the values of V and V_1, and reducing the equation by the aid of logarithms, we find

$$d_1 = 1.18\, d.$$

This rule applies to *all* the pipes in the district—mains, services and house pipes alike. If the main outlet from the works, for instance, had been 16 inches for the lighter gas, a main of $16 \times 1.18 = 18.88$, or, practically 20 inches, would have to be substituted for the heavier gas.

All these rules may also be applied in the case of a company changing from coal to water gas. The difference in density of the two cases is, of course, much less in this instance than in the one considered above, but it is still very appreciable and quite likely to cause more or less trouble. We have in this case the specific gravity of the coal gas, 0.420 and that of the water gas, 0.650. When sending out the latter in place of the former without increase of the initial pressure the diminished volume of sendout would be

$$V_1 = 0.8\ V,$$

or, in other words, the output would be cut down 20 per cent. The pressure required to restore the output to the original figure and get square with the consumers would be—

$$P_1 = 1.56\ P,$$

which means that the pressure sufficient to put out the volume, V, of the lighter gas, would have to be increased 56 per cent. to turn out the same volume of the heavier matter. Or, if a manager should intend to increase the size of his pipe lines and to continue to distribute under the old low pressure, the new diameter of his pipes would want to be—

$$d_1 = 1.094\ d,$$

or very nearly 10 per cent. larger than formerly. Nor should our investigation of the problem stop here. The meters in use may have been sufficient for the lighter gas, but will not pass as much of the heavier without additional loss of pressure. For instance, a 3-light meter, which passed formerly 20 cubic feet per hour under a loss of $\frac{1}{10}$-inch pressure, will, of the heavier gas, pass only 16 cubic feet, with the same loss, or 20 cubic feet with a loss of pressure 56 per cent. greater than before. And, last of all, the burners, even if the gas is delivered to them under the same pressure as in the coal gas times, will only burn 80 per cent. of the former volume. In other words, a 5 cubic foot burner becomes a 4 cubic foot one.

All these things want careful consideration. Changes in sizes of mains, services, house pipes, meters and burners can be made only very slowly and gradually, and, in some cases, not at all. In the meantime, the only remedy is the increase of pressure, which should be made on the basis of a calculation as indicated above, with perhaps an additional allowance to overcome difficulties in the main system, which will be intensified by the introduction of the heavier gas. In this way *only*, justice will be done to the new gas, otherwise the cry will go up that, although the gas company is claiming to produce richer gas, it is in fact worse than ever before. The light given as measured in a photometer room, where the pressure can be nicely adjusted to the standard consumption, is one thing; the light as it appears in the consumer's house, however, is another.

THE firm of J. H. Horne & Sons, of Lawrence, Mass., have decided to build a new machine shop, to be 64 feet in width and 107 feet in length. The contract for same has been placed with the Berlin Iron Bridge Company, of East Berlin, Conn.

Electric Lighting from a Financial Standpoint.

We are in receipt of an inquiry from a correspondent at Pittsburgh, Pa., for a copy of the paper read by Mr. Erastus Wiman at the last convention of the National Electric Light Association (Feb., 1892, Buffalo, N. Y.), and in response thereto we give the paper in full. Mr. Wiman, we might incidentally jot down, is well qualified to put on record the assertion, "It may as well be admitted that there has been a serious and costly struggle, and that, taken as a whole, the results in the shape of a total profit on the total investment in electric lighting are not in the shape of dividends," since his experience in respect to one or more electric lighting ventures in his Staten Island kingdom have been far from satisfactory. The paper is as follows:

It would seem as if, in the evolution of progress on this continent, electricity was the flower and fruit. The stupendous change which in the condition of the human race has been possible by development on this side of the sea needed just such a revelation as is possible only in electrical science. A drama of such proportions, on a stage of such magnitude, by a people of such intelligence, illustrating such principles as self-government, such as a material progress beyond all that the world has ever seen, needed above all things a new force, a new hint from the mysteries of the unknown, a new law of nature as forceful as gravity, as helpful as heat, as widely diffused as air. Electricity thus takes its stand just at its right place in the marvelous procession of events in the human progress toward a higher and nobler life, which has been rendered possible by the discovery of America.

But in contemplating the progress made in the last century, and seeking to discover the influences and forces that have most contributed to the growth of wealth, to the comfort, safety and happiness of the human race as illustrated on this continent, it may be safely claimed that electricity, even in its early stages, has played a not unimportant part. It would seem as if in a country of such vast areas as is the United States nothing in the whole category of events would be so highly beneficial as a means of instantaneous communication, and yet this vast boon of instantaneous communication was only possible by electricity.

Incidental to the unequaled usefulness of telegraphy in the marvelous progress of the country, has been its contribution, in a special degree, to the railroad service, which to so great an extent has contributed to material growth, the increase of wealth, and to the comfort and happiness of humanity. The use of the railway telegraph has practically doubled the tracks of every single-track railroad on this continent, rendering the movement of trains so precisely, so rapidly and so safely that without this facility of instantaneous communication the railroads would not have achieved half which by its aid has been accomplished.

But just as telegraphy had reached its perfect degree of usefulness in general purposes, as in the railroad service, shown by the perfect growth in electrical science, it was supplemented by a still more wonderful faculty of communication in the telephone. My friends, in all the series of wonders which the electrical world has revealed, this telephone is to me the most wonderful. To a layman like myself, who simply wanders along the outer edges of this magical land of discovery, this transmission by the aid of electricity of the human voice in audible and natural tones to great distances, is of all things the most marvelous.

But another field of opportunity for the usefulness of electricity for the benefit of mankind has been found in its uses for the creation of light. It is a singular fact that so many ages had passed since the world began, and that only by the slightest degrees was the darkness that falls like a pall upon the earth mitigated. Many can even now remember, especially in country places, the tallow dip, the short sixes, the oil and spirit lamp, and the uncertain though mellow rays of the finished wax candle. It is quite within the memory of many men here that petroleum with its wonderful power of illumination was discovered, and all the world has since been blessed, not only by its illuminating power, but by the business skill and sagacity which through the Standard Oil Company has diffused this article so universally, so safely, and so cheaply; illustrating the high benefits of a well managed monopoly as against the universal condemnation of that economic feature of the hour.

With the discovery and development of gas, of course, a vast change took place. But in the 60 years of its development, before it reached its meager perfection, there was the slowest kind of progress, so that it is only up to within the last half century that artificial illumination became at all general, even among great aggregations, like cities and towns.

It remained, however, for electricity, and within our own lifetime, to beget a degree of success in this wonderful work of the creation of light that nothing else had ever yet achieved. It may be doubted if in the

history of any science the same rapidity of movement has been made as in the adaptation of this form of energy to the highly useful and beneficial purposes of the creation of light. For instance, remote places adjacent to cities, to which a gas main was an impossibility, have been reached by an electric wire. Neighborhoods have been joined together, localities connected, and property increased in value by rendering communication at night secure and safe as in the day. In the application of the arc light to public works of great importance, like aqueducts, tunnels, and especially to manufacturing, numerous branches of business are susceptible of being carried forward 24 hours in the day, which without it would be impossible. Thus is doubled the capacity of many establishments, and the earning power of many an investment. In all public places, as in theaters, halls, and in almost all business establishments, where business after the setting of the sun is essential, electricity is already beginning most effectually to supplement daylight, and play a part almost as effective as the sun itself.

It will thus be seen that so far as fulfilling the purposes of its manufacture, electric lighting is a definite and ascertained success. So far as experimentalization is concerned, nothing now remains to convince the public of its safety, of its effectiveness, of its healthfulness, and of its general adaptability to all circumstances. Hence, as an article of merchandise, the light furnished by electricity is just as much in demand to-day as wheat or corn, as beef or bread. So that this assemblage of electric light men may congratulate themselves that, notwithstanding many difficulties and obstacles, they have, by the excellence of material, by its reliability and effectiveness, created an article of merchandise of real value, for which there is a strong demand.

It is true that in the creation of this article of merchandise, up to this period, there have been many mistakes. There has been a great waste of money, and if the past had to be lived over again there are not a few who would shape their policy in an entirely different way to achieve the result now reached.

The question of profit remains to be decided in very many localities. I have been favored during the last month or so with an enormous number of letters, in response to a request for information as to the condition of the electric lighting business all over the country. A great deal has been sent me of a confidential nature, and I can only give the general impression which the whole correspondence has made upon my mind.

My conclusions are (1) that there is an enormous demand, only as yet partially developed and partially met, for electric lighting; (2) that the public have been led to believe that it can be created for very little money; (3) that in competition with gas an insufficient price has been asked for a light infinitely more brilliant, infinitely greater in candle power, far more healthy, and, as a rule, far more safe; (4) that at the start of many electrical plants the most meager and insufficient foundations were laid for a business requiring the utmost precision and the most perfect material.

It is these conditions, coupled with the rapidity with which inventions have followed one upon another, the constant reduction in the price of electrical machinery, the rapid growth of electrical appliances, and the radical changes and methods which in six months would appear to be old in the history of a business which was so new and making such tremendous strides, as make it exceedingly difficult to maintain the expenditure on capital account within the original limit of corporations.

Looking back upon the past, it is easy enough to account for the difficulties, obstacles and want of profit in many establishments, but if there is one thing more than another that has made the progress toward profit a difficult one, it is the mistaken apprehension of the public that electricity can be got for nothing. There is something so mysterious and occult, something so magical about electricity, that the impression has got abroad that it is only necessary to press the button, and with the least exercise of skill, labor or expenditure the miracle is produced. The attempt to compete with poor gas, at a low price, with infinitely less illuminative power, was of course a necessity. But the public estimation of electricity has never yet reached the standard which it should have done. The slow introduction of the current into private houses is perhaps the best illustration of this condition. Even to-day, in some cities, it is thought that the arc light can be had for 15 cents a night, and the incandescent light for a mere song; $15 a year is slightly over a quarter of a cent an hour, yet for this, for 10 to 12 hours, a beautiful bulb of incandescence is expected at every street corner, and in every remote suburb, for almost less than it would ordinarily cost to burn a wax candle.

The public estimation of the cost of electric lighting has been allowed to preval to an extent destructive of profit. There has been an hallucination prevalent that there was something miraculous about the production of electricity. The cost of coal, labor and machinery has not entered into the calculation of either the ordinary city official or the private consumer. The expectation that something would be produced for nothing, which inheres in the human mind as to the possibility of invention, has attached itself to electricity more than to any other element in the supply of human wants. The consequence is that in making new contracts, even to-day, there is the strongest disposition to get the prices down, not to what the article can be produced and paid for, but for the least possible amount, irrespective of profit, and equally irrespective of efficiency. There is a true and a false economy, and that is the falsest kind of economy that expects a public service at less than the cost of its output and a fair profit.

Having in the process of time developed a large demand for light, evidences of which are seen on every hand; having at the same time gone through a most unusual experience in not only creating that demand, but in the production of the article for its supply, a review is in order as to the present position of electrical securities and the prospect of profit. It may as well be admitted that there has been a serious and costly struggle, and that, taken as a whole, the results in the shape of a total profit on the total investment in electric lighting are not to be seen in the shape of dividends. There are, however, happily, exceptions to this general statement, and in the returns sent to me from all parts of the country there are a considerable number of companies whose career has shown that in electric lighting there resides the potentialities of a profit equal to that of any legitimate enterprise. The successful companies illustrate what it is possible to do, and although they may not be numerous in comparison with others whose record for profit is small, or who report a loss, yet that money can be made continuously and rapidly out of electric lighting is clearly demonstrated. In order to cite an example of steady growth in revenue, and also to show the corresponding ratio of expense, I append the figures, for seven years, from one of the most successful companies in the East, whose management has been characterized by the highest ability, and whose location and name it would hardly be proper to disclose. The figures are authentic, and show a record of which any man might be proud:

Earnings of an Electric Light Company.

For 1885—Receipts	$30,768 70
Expenses	24,901 54
Net earnings	$5,867 16
For 1886—Receipts	$47,613 76
Expenses	34,700 83
Net earnings	$12,912 93
For 1887—Receipts	$57,750 71
Expenses	34,691 85
Net earnings	$23,058 86
For 1888—Receipts	$75,734 14
Expenses	46,235 83
Net earnings	$29,498 31
For 1889—Receipts	$135,254 08
Expenses	94,178 69
Net earnings	$41,075 39
For 1890—Receipts	$199,195 72
Expenses	150,195 48
Net earnings	$49,000 24
For 1891—Receipts	$247,679 88
Expenses	187,092 77
Net earnings	$60,587 11

The Company commenced to pay dividends Jan. 1, 1887, at the rate of 8 per cent., payable in quarterly dividends of 2 per cent., and have continued the same up to date.

Before closing the books Dec. 31, 1891, we charged off from the earnings of 1891, for depreciation, $10,000 from the steam plant and $30,000 from the electric plant. On Jan. 1, 1892, capital stock, $800,000; surplus, $90,000.

The above figures speak for themselves, and in the progress shown in receipts and profits there is contained a hopeful sign for many another company whose career up to this time has yielded an inadequate return. Indeed, to present a totally different picture, here is an extract from the letter of an esteemed Western friend that shows the ruins of senseless competitive struggle and the folly of low prices:

"I am the president and manager of five electrical light companies in this city, but three of which have actually survived financial pressure and bankruptcy. One of these three, with a capital of $150,000, fell behind nearly $100,000 in seven years, and last year the stockholders voluntarily came up with an assessment of $60,000 to save it from bankruptcy. Another, working under the strictest economy, is but barely able to meet operating expenses. Still the other, a foundling of the gas company, is, under exceptionally favorable conditions, and paying no salary to its executive officer, making a little money; after 18 months operation, it last month declared a dividend of 3 per cent."

With such an experience it is no wonder that the gentleman writes as follows: "I am aware that books can be kept so as to show an earning, but this is in many cases at the expense of a constantly depreciating capital investment"

These two extremes of success and failure tell the whole story of electric lighting in the past seven years. The companies that have succeeded have done so under favorable circumstances, with a freedom from ruinous competition, exacting good prices, and, above all other requisites, with good management. If there is any department in human activity where brains and tact are required to a greater degree than any other, it is in the administration of an electric lighting plant. This is evident, not only because there was a great lack of experience and knowledge of a business, that was in the production of an article that was in a certain sense mysterious and unknown, but because there has been an amount of misapprehension as to its cost on the one hand and its value on the other hardly ever experienced regarding any other article of merchandise.

Some attempt has already been made to account for a misunderstanding as to the cost of electric lighting, but it is proper to allude to the folly which has prevailed in selling it for less than cost. The insane competition with each other in localities where one company was needed and more than one was ruinous, is well nigh passed, but, there remains the competition with gas companies and the effort made to constantly lower the standard of electricity to that of gas. It was perhaps essential that in the early history of the effort to use electricity as an illuminant, it was necessary to get down to the standard of the fumes of coal, and in order to show the superiority of one over the other, to yield for a time in the matter of profit. But so rapid has been the growth in the use of electricity, so immeasurably superior is the current to the fume, in health, in brilliancy, in beauty and attractiveness, that the time seems near when electricity can claim the rightful place, and demand the price just so much higher as it is an illuminant just so much better. An advance in price commensuratewith the superiority in the article produced would add largely to the earning power of electric lighting companies, and it is time it was contemplated and acted upon.

One misfortune has been in electric lighting that a large investment has been available for only a small portion of the time. All day long, when other works by rental or by active employment were earning money, electric light plants have been compelled to stand idle. Even gas companies spend the whole day making gas, accumulating it in their reservoirs for distribution during the night. Electric light plants, however, are compelled to manufacture and distribute at one and the same time. A change, however, impends, in which these costly plants and lines of copper can be used every hour in the twenty-four. The development of the facility for the transmission of electricity for power has, however, within the last two years, made rapid progress. The introduction into small manufactories of the current to be used constantly or intermittently has, in many localities, become very general. Already in the correspondence sent to me there are quite a few indications illustrating how advantageously the electric light plants can be used during the day for the purpose of power. In cities where manufacturing is going forward there are hundreds of establishments in which the power required can be furnished from a central station. In the working of sewing machines, both in large establishments and in private houses, in the running of small lathes, hoisting machinery, elevators, and even large trip-hammers, in the circulation of air in sick chambers, in even rocking the cradle, the usefulness of electricity is becoming apparent, so that a new era opens for the usefulness of the plant, poles, wire and franchises during the day.

In this respect, with this in view, the whole electrical community are watching with intense interest the possibility of the development in this city of Buffalo of electrical transmission, arising out of the successful effort which is now being made to harness the power hitherto latent in the Niagara River. The boldness of the proposal, the extent and character of the enterprise which is now nearing completion in this effort, the pluck and push in the work, challenge alike the attention of the engineering and commercial world. The relation of this enormous power of nature to the transmission of electricity is the most important consideration which now occupies the thoughts of those most interested. The success which has attended the three-phase current from Lauffen to Frankfort in the transmission of power 112 miles, without material loss, comes just at the right moment to make it seem possible that the enormous potentialities in the forces of Niagara, can be made to reach a degree of usefulness never dreamed of in the past and hardly realized in the wonderful present. It seems fortunate, therefore, that the convention which is here assembled should, as it were, be in the presence of the most stupendous event possible in the history of the science of electricity. In the development of the next few years will be found ample food for thought and effort, out of which may grow a relief for electric lighting plants of the greatest possible consequences.

If in the city of Buffalo and from the Niagara river there can be transmitted power in such enormous proportions as are now contemplated, subdivided and reduced, so that into every factory and almost into every house the force and energy can be controlled and operated, there is latent in every central station the possibilities that may come to every town in the country and to all the electric light plants now idle during the day, an imitation in modified form of the power that of all forces in the world Niagara is the best example.

The success which has in so brief a period attended the application of electricity to traction, and the enormous numbers now moved throughout the country by electrical roads, make it reasonably sure that before very long steam roads in crowded localities will be worked by electric energy. Already the great Illinois Central, having so large a portion of its tracks in the city of Chicago, has in contemplation this marked change. The Wisconsin Central is also favorably considering it. Possibly it is a little too soon to anticipate this change, but that it is coming there can be no question.

In New York City, in Boston, in Brooklyn and in such suburbs as Staten Island, there is no reason why electricity should not be substituted for steam. Steam locomotives, built to carry their coal about, and to employ an engineer and fireman for each 500 h. p. generated, cannot compete with the great compound, condensing stationary engine, whose forceful power can be extended by a delicate wire distances of 25 miles and under.

In the telegraph business a larger capitalization exists, in proportion to the cost of the material, with a capacity to earn a dividend upon the amount, than in any other department; while in the telephone, and more recently in the electrical railways, the amount realized is in excess of that from any other investment. It is true that in electric lighting a universal success has not been achieved, but beyond all question a great and useful purpose is being served in the creation of light, for which a profitable and steady demand exists, and which can be supplied through the experience and the improvements attained, as the result of the operations thus far.

The future is full of promise for these undertakings, especially in the value of the franchises, the ability to furnish power, in their combination with the gas industries of the country, which must be only a question of time, and in their ability to promote and to assist in the application of electricity to street railway enterprises. The whole subject of electricity, as applied to business, is full of the deepest interest, and no one who feels grateful for having been born in this age, and enjoying all the advantages of the most advanced civilization, can fail to recognize in this wonderful force the advantageous contributions toward the good of mankind, and hold in high estimation the men who, in so short a period, have so rapidly promoted its introduction and high degree of usefulness.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

It is with unbounded satisfaction we write it down that Mr. William Wallace Goodwin is improving in health every day. His patience, fortitude and courage have about won the battle, and his legion of friends, who will never forget the "Goodie" of their day and time, may count it a fact that he is to be with them and of them again.

Some days ago Mr. W. H. Hayden, Superintendent of the Bath (Me.) Gas and Electric Light Company, was greeted by a visitor from the "surrounding" foothills, and the visitor also carried with him a 5-gallon stone jug. Depositing the latter on the floor of the office, the foothills man, in a matter of fact way, said, "I'd like to have that jug filled with gas, if you please." As a rule, Hayden is not easily "rattled," but this time he failed to catch his breath as readily as is his wont. With the return to normal of his breathing apparatus, Hayden ex-

plained the situation, and the foothills party then "allowed" that it was gas tar he was instructed to ask for.

WRITING about the visitor and the tar, suggests the hint that the improvements on the gas division of the Bath Company's property are underway, and that when these are completed the plant will be up to the times, and up to what is required by those who depend upon it for light. The betterments are being carried out under considerable difficulty, as the following extracts from a letter recently received by us from Bath will show: "* * * The news that a shipment of the material contracted for was *en route* necessitated immediate changes in the works to the end that an uninterrupted supply of gas could be maintained during the erection of the new arches and the setting up of the condenser and exhauster. To do this we were obliged to take down the hydraulic and the take-off pipe, placing the section with outlet in the opposite or north end of retort room, and connecting to that end with a run of 30 feet to condenser. We commenced work at 4 A.M., last Sunday morning, working Sunday (29th April) and Sunday night, the changes being completed, with everything in readiness for charging the retorts at 11 A.M. of Monday. We will begin tearing down two benches of the three in our old stack on Wednesday (May 4), in order to commence building the new ones on Monday week (May 9). The new holder work will be left to the last, as we will need the old one until such time as as we can use the new benches, exhauster and condenser. * * *."

MR. JOSEPH W. BEATLEY has been appointed Mechanical and Constructing Engineer to the American Gas Company, the parent concern which proposes to exploit the Harris gas process throughout the country. The headquarters of the Company are in the building of the Washington Loan and Trust Company, Washington, D. C.

THOSE who came to New York last October from the West, for the purpose of attending the annual meeting of the American Gas Light Association, and who made the trip in the special car, arranged for chiefly through that adept in making matters smooth and safe—Mr. Fred. R. Persons—will also no doubt remember the courtesies extended by Lou Hoesner, Agent for the Michigan Central Railroad Company, at Chicago. It is reassuring, then, to know that while the jolly Fred. will not (because of other matters that will require his undivided attention about mid-May) chaperone the delegation that will leave Chicago for the Detroit meeting of the Western Association, Mr. Hoesner will personally attend to the comfort of those who will make the trip by way of the Michigan Central.

AT the annual meeting of the Ann Arbor (Mich.) Gas Company the following officers were chosen: Directors, E. D. Kinne, S. T. Douglas, David Rinsey, J. W. Knight and H. W. Douglas; President, E. D. Kinne; Secretary, S. T. Douglas. The annual report of the Superintendent showed that the business done during the year had been of such volume as to tax the capacity of the plant to the utmost. In consideration of this the Directors discussed the subject of rebuilding the works, and, from their subsequent action in reducing the gas rate to $1.60 per 1,000 cubic feet, we imagine they have virtually concluded to double the capacity of the works. Gas at $1.60 per 1,000 cubic feet is certainly a cheap rate for Ann Arbor, where the annual sendout cannot be in excess of 12 millions. The business principles that animated the late Prof. Douglas in the conduct of this works evidently have taken firm hold of his successors.

MR. J. R. LITHGOW, Treasurer and Manager of the Glace Bay Mining Company, the collieries of which are located at Little Glace Bay, Cape Breton, writes to us, from Halifax, N. S., under date of April 28th, in the following strain: "Our attention was called a week or two ago to a paper read by Mr. W. A. Wood,* of the Boston (Mass.) Gas Light Company, at the 22d Annual Meeting of the New England Association of Gas Engineers, wherein he referred to Glace Bay coal as 'sulphur.' In connection with the purifying process he wrote as follows: 'From 3 to 5 boxes were changed daily, but we kept ahead of the procession until we were able to charge our retorts with good coal instead of sulphur.' The paper shows that by 'sulphur' he meant Glace Bay coal. Now, as the coal we ship is very often called Glace Bay, although properly it is Little Glace Bay, we wrote Mr. Wood that if he found the coal he designated as 'sulphus' was not Glace Bay or Little Glace Bay to send you a letter explaining that he did not refer to our coal. He has promptly written us as follows:

"'DORCHESTER, MASS., April 23, 1892.

"'Mr. J. R. Lithgow, Treas., Halifax, N. S.—Dear Sir: In answer to yours of 21st would say that 'Glace Bay' is a term commonly used and understood by American gas engineers in speaking of Provincial coals, and was so used by myself in the paper mentioned, as I desired to avoid specifying coal from any particular mine. As 'Little Glace Bay' coal was not mentioned in my paper, I fail to see wherein you have cause for complaint. I think you will find the term commonly used as stated above in a general way—just as we distinguish Pennsylvania, West Virginia, and Ohio coals, each embracing a large number of variously named mines, of which each kind is 'better than the other fellows.'—Yours truly, W. A. WOOD, Supt.'"

"We respectfully submit that as Mr. Wood 'desired to avoid specifying coal from any particular mine,' he should not have called it Glace Bay—a name by which our coal is very generally known. Further, as the seam of coal we work, in common with the International Coal Company, is the only gas coal used in Quebec and the Maritime provinces, it can hardly be true that it is 'sulphur.' The fact is that it is an excellent gas coal, little inferior in yield of gas to American; and for coke unsurpassed.—J. R. LITHGOW."

IT is rather unfortunate for Mr. Lithgow that he should have paid such serious heed to the remark made by Mr. Wood in his paper, and it is all the better for Mr. Wood that the preponderance of testimony, in the shape of carefully collected statistics, which are easy to obtain, is in support of his position. Of course, we do not presume that even Mr. Lithgow is willing to go to the extreme of taking Mr. Woods expression, that the coal was sulphur, in its verbatim and literal sense, because Mr. Wood admits that the coal did yield gas, and so on. In the course of the admirable paper on "Gas Coals, with Special Reference to Provincial Coals*," read by Mr. Jas. D. Perkins, of this city, before the Toronto meeting (1888) of the American Gas Light Association, Mr. Wood will find ample support of his intimation that gas coals from the Glace Bay portion of the Cape Breton district are very sulphurous, when compared with the standard gas coals of America. Nor can the authority which we quote (Mr. Jas. D. Perkins) be considered a prejudiced one in respect of his findings over Provincial coals—for he long acted in America as a factor for the sale here of these coals—and, in fact, the statistics which he presents are the averages of analysis made by those interested in the development of the Canadian coal beds—we use "Canada" in the sense that it represents all of the North American possessions under the British flag. Mr. Perkins reports that the average result from specimens of the Cape Breton or standard Provincial gas coals—Block House, Glace Bay and Caledonia—show a content of sulphur of 3.01 per cent., as against a content of 1.50 per cent. of sulphur in analyzed specimens of the standard American gas coals—Westmoreland, Penn and Youghiogheny. Where the purifiers of a gas work are being driven to the utmost (as was no doubt the case with Mr. Wood, at the time of which he wrote), any engineer will estimate at its true worth the perplexity arising from cleansing a gas carrying an increase of 100 per cent. in sulphur over that that had been manufactured a short time before. The bare thought of the changed conditions would be a veritable bugbear. Further, we quote the concluding portions of Mr. Perkins' paper, with the remark that those interested in the subject will find it profitable to look the paper up and renew their acquaintance with its practical thoughts. Mr. Perkins said: "The coke produced from the American gas coals herein named is a most excellent article for house and general use, but *not so strong* for use *under the retorts* as that obtained from the Cape Breton coals, or from the sulphurous gas coals obtained from Western Virginia. Those gas companies whose *facilities for purifying are ample* prefer to have *one-fourth* to *one-third* of their coal from either Cape Breton or West Virginia, in order to get a *stronger* coke than the standard Pennsylvania coals afford. It will be noticed that the American coals produce 20 per cent. *more* coke than the Provincial coals—a very important item when it is considered that from 50 per cent. to 60 per cent. of the coke made is *sold* by the bushel for house use. One bushel of hydrate of lime will purify about 5,000 cubic feet of gas made from American coal, and about 2,500 cubic feet of gas made from Provincial coal."

A CORRESPONDENT at Des Moines, Iowa, forwards us the following, under date of April 29th: "The case of the Capital City Gas Company vs. the city will come up Monday morning (May 2) in the District Court before Judge Conrad. It will be one of the hardest fought battles ever waged by the city, and Solicitor Brennan and his assistant, Mr. Baily, will attempt to demonstrate that the ordinance passed by the City Council fixing the price at $1.15 per 1,000 cubic feet is legal and reasonable. Mr A. B. Cummins who will appear for the Gas Company has the task before him of attempting to prove to the Court that gas cannot be manufactured and sold in Des Moines for less than $1.50 for fuel purposes

* Ante, p. 398.

*See JOURNAL, Nov. 16, 1888, p. 351-2-3-4.

and $1.70 for illuminating purposes. Both sides will be backed by d positions from experts, and the case will last a week or more, after which Judge Conrad will take it under advisement before handing down an opinion. City Solicitor Brennan and Mr. Cummins have made a trip to a number of eastern cities where the gas plants were inspected and the officers of the companies interviewed. The two questions which will be brought up are the legality of the City Council's action in regulating the price by a new ordinance, and the question of the reasonableness or unreasonableness of the $1.15 price."

SOME of the people in authority, or owning or controlling gas works in the East, would not be any the poorer did they believe that latitude is not necessarily license, or that liberty is not anarchy. We refer to the owners who urge that membership in the "Gilde," as they term it, is not the way to accustom one's steps to the rocky road that leads to the pinnacle of egotism. The owners, for once, are right. Membership in the Guild means fraternity, and fraternity means success—in the gas business, perhaps, more than in any other branch of trade.

ON May 2d the annual meeting of the Easton (Pa.) Gas Company was held at the office on North Front street. When the annual reports had been read an election for Directors resulted in the choice of the following: Messrs. Wm. A. Bush, W. G. Stewart and E. A. Depew were elected to serve three years, and Mr. George M. Odenwelder was elected to serve two years, to fill the unexpired term of the late Mr. Edward Hilliard. Subsequently the Board organized by naming the following officess: President, Samuel Boileau; Secretary, W. G. Stewart; Treaserer, Edward S. Lawall; Superintendent, William H. Ward.

THE reorganization of the Citizens Gas Light Company, of Quincy, Mass., has been effected in business like style; and, if we are to judge from the names of those now interested, the Company is sure to prosper. The executive management now is as follows: Directors, William H. Hill, Calvin Austin, F. H. Odiorne, A. M. Copp, and E. B. Stoddard. President, William H. Hill; Treasurer, Calvin Austin. That one may look for progressive ideas at Quincy is best shown in the fact that all discounts on the gas rate have been abolished, and an all-around net rate established. While we are not positive about the figure, our impression is that the lowest former net rate ($2 per 1,000) has been adopted as the standard. We congratulate Messrs. Copp, Odiorne and their associates on their initial move.

THE proprietors of the Clinton (Mass.) Gas Light Company have just closed a contract with the authorities for the public lighting of the place by electricity for a period of three years, from the 1st of September, 1892. The price agreed on for all night lights, of 1,200-candle power each, is 35 cents per arc per night, 25-candle power incandescents to be charged for at the rate of 9 cents each per night. Under the agreement the Selectmen are to determine each day if the lights are to be run on the ensuing evening; but, practically, the lights will be operated each night, save when the "full moon is surely shining." The town has about 11,000 inhabitants, and the Company now supplies on public account about 40 arc lamps and 142 incandescents, with a prospect that a few more will speedily be ordered into circuit. Two years ago the Clinton Gas Light Company did not supply a single incandescent lamp with current, whereas to-day it is furnishing some 2,500 lights of this type, varying in candle power from 16 to 25, and also 60 arcs, of 1,200 candle power, with the possibility of soon furnishing motor power for a proposed street railroad that is now in process of organization; and despite all this the Company is sending out more gas now than it ever did in its prior history. Treasurer Bigelow seems to about fit the Clinton artificial lighting situation.

ON next Monday the electors of Sheldon, Ia., will vote on a proposition to grant Homer W. Conant a franchise to put in an electric light plant.

THE Cleveland (O.) Electric Light Company recently settled with the families of two linemen who were killed by the current while in the discharge of their duties. A third case, suit in which was brought by Annie Roark, widow of Felix Roark, who was killed by the current something over two years ago, was also compromised. She sued for $10,000, but accepted $2,250 in compromise.

MR. J. E. SHATZER has leased the gas works at Dover, Del., and will personally manage the same. The information is received from what cannot be held to be other than reliable source, but our impression was it would take a very large bid to release the control of these works from the Richardson family.

MR. WILLIAM ENFIELD, who for the past six years has managed the important gas properties owned by Messrs. Schneider and Connor, at Dallas, Tex., with skill, care and success, tendered his resignation of that trust some time ago; and we are sorry that he did so. However, we must accept the conditions, since he has accepted them, and since his Company has agreed thereto. He has their best wishes—he could not have anything else from the JOURNAL—however, as may be seen from the following expression put on record by Mr. J. E. Schneider, President of the Dallas Gas and Fuel Company:

Mr. Wm. Enfield, Engineer and General Manager the Dallas Gas and Fuel Company—Dear Sir: I regret very much that you are going to leave us, as Superintendent and General Manger of our Company. After six years of faithful service, during which time we have always found you competent, honest, sober, industrious—ever watchful of the Company's interest, I can cheerfully recommend you as a gas engineer second to none. In whatever business you may engage hereafter, I assure you that you have the best wishes of myself and associates. Yours truly, J. E. SCHNEIDER, Pres.

MR. ENFIELD, on his retirement from the Dallas Company, engaged with the Texas Ammonia and Chemical Company, as Manager, and on May 1st he resigned therefrom to take charge of the gas and electric light plant at Texarkana, Ark., in which enterprise he has purchased a controlling interest. His departure for Texarkana was signalized by a dinner that was served in the still room of the Chemical Company.

AND his resignation of the Dallas trust was punctuated by a surprise from the gas works employees, who visited the office in a body, and, through Mr. Dinkelspeel, one of their number, presented the retiring Manager with a handsome watch chain and charm. The gift was preceded by a very feeling address, to which Mr. Enfield responded in his own inimitable way.

JUDGE HERRICK has granted a decree dissolving the Cooperstown (N. Y.) Illuminating Company. Mr. Walter H. Bunn has been appointed Receiver, he to file a bond of $10,000.

THE artesian well (6-inch) on the property of the Worcester (Mass.) Gas Light Company has been completed. It will discharge 100 gallons per minute.

ATTENTION is called to the change in headquarters of the Connelly Iron Sponge and Governor Company. The Company's offices are now at 351 Canal street.

THE Berlin Iron Bridge Company has been awarded the contract for the new rolling mill which the Waterbury Brass Company, of Waterbury, Conn., will build to replace the one lately destroyed by fire. It is said that this will be the finest rolling mill in the Naugatuck Valley, and its dimensions are 150 feet in width by 350 feet in length. The side walls are to be of brick, and the iron roof trusses are to be inclosed with the Berlin Bridge Company's Patent Anti-Condensation Corrugated Iron Roof Covering. The building will be absolutely fireproof.

WE understand that the plant and franchises of the Davenport (Ia.) Gas Company are to be bonded in $150,000, a portion of the proceeds to be expended on betterments.

THE Westmoreland Gas Coal Company has purchased 1,500 acres of coal lands situated in Versailles and North Huntingdon townships, Westmoreland county. The Company will build a spur, to connect at Fulton post office with the Sewickley branch of the Pennsylvania Railroad. The property is contiguous to that now operated by the Company, and we understand that the price paid for the 1,500 acres was $250,000.

THE holder that is to be used for supplying gas to the people of Summit, N. J., and the adjoining towns, is to be located between the tracks of the Delaware, Lackawanna and Western Railroad Company and Springfield avenue, in the town of Maplewood.

THE officers chosen at the reorganization meeting of the Brockton (Mass.) Gas Light Company are as follows: President, Alfred Kimber; Treasurer, W. A. Stetson; Superintendent, E. B. Mooney; Directors, Alfred Kimber, W. A. Stetson, C. A. Andresen, W. H. Hildreth and Chas. B. Wheelock. The Company has reduced the selling rate to $2.10 per 1,000 cubic feet—a cut of 15 cents per 1,000.

SUPERINTENDENT PRICHARD has arranged for the dredging out of the channel at the Lynn (Mass.) Gas Company's wharf. When the work is completed—it is estimated that it will cost upwards of $50,000—vessels of deep draught can be easily brought to the landing.

THE AMERICAN GAS LIGHT JOURNAL

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PROPRIETORS.

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MONDAY, MAY 9, 1892.

The Market for Gas Securities.

The feature in city gas shares for the week was the advance in Equitable, which jumped 5 points, to 150 bid, with a much greater inquiry for the shares than has been made in a long period. Consolidated was somewhat weaker than at the time of last writing, the opening price to-day being returned at 113½, sellers holding out for 114—a change of half a point in Consolidated is of some moment these days. The annual meeting of the Standard Company will be on Wednesday next, and the probabilities are that harmony will rule. In any event it may be taken for granted that business principles of the steady sort are to rule, now that Mr. McKeige has the advice and counsel of such men as Messrs. Sage, McAlpin and Terry, who are not of the emotional kind when it comes to counting the cost. Mutual holds its own. In Brooklyn, gas shares as a rule are weaker, the exceptions being Citizens, Nassau, Fulton-Municipal and Williamsburgh, which have about held their own. Peoples is off fully 5 points and Brooklyn about the same. Bay State gas is at 61, Laclede common, at 19¼, and Chicago gas is strong, at 78⅛. Mr. Thos. J. Agnew has been appointed Receiver for the Staten Island (N. Y.) Gas Light Company, which looks as though the affairs of the Stapleton gas district are about to be settled up at last.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST., NEW YORK CITY.

MAY 9.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	113½	114
Central	500,000	50	—	90
" Scrip	220,000	—	—	100
Equitable	4,000,000	100	150	155
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	135	—
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	40	45
Preferred	5,000,000	100	91	93
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	108	—
Citizens	1,200,000	20	104	104½
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	130	—
" Bonds	300,000		102	—
Peoples	1,000,000	10	85	—
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	101	—
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	139	—
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	123	—
" Bonds	1,000,000	—	107	110
Out of Town Gas Companies.				
Boston United Gas Co.—				
1s Series S.F. Trust	7,000,000	1000	89	89½
2d " " "	3,000,000	1000	78	78½
Bay State Gas Co.—				
Stock	5,000,000	50	60¾	61¼
Income Bonds	2,000,000	1000	6	8
Buffalo Mutual, N. Y.	750,000	100	110	—
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds.	45,000	—	—	—
Chicago Gas Company.	25,000,000	100	78⅜	78½
Chicago Gas Light & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	90½	90⅞
Equitable Gas & Fuel Co, Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	102	—
2d "	2,500,000	1000	101½	—
Consumers Gas Light Co., Jersey City	2,000,000	100	15	20
Bonds	600,000	1000	72½	75
Cincinnati G. & C. Co.	7,000,000	100	—	200
Consumers Toronto	1,000,000	50	180	185
Central, S. F., Cal.			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	55	55½
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	101
Bonds	250,000		—	—
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn	750,000	25	120	128
Jersey City	750,000	20	180	200
Louisville, Ky	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	19	19¾
Preferred "	2,500,000	100	60	63
Bonds	9,034,400	1000	81¾	81⅞
Montreal, Canada	2,000,000	100	200	208
Memphis (Tenn.) Gas	750,000	100	40	—
" Bonds.	240,000	100	103	—
New Haven, Conn		25	200	—
Oakland, Cal.			34¾	35¼
Peoples, Jersey City		—	115	125
" " Bonds.			—	—
Paterson, N. J.		25	99	102
Rochester, N. Y.		50	99	100
Syracuse, N. Y.	500,000	25	—	—
San Francisco Gas Co.				
San Francisco, Cal.	10,000,000	100	63	63½
Washington, D. C.	2,000,000	20	200	208
Wilmington, Del.		50	88	90

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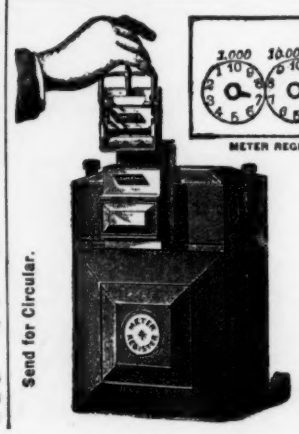

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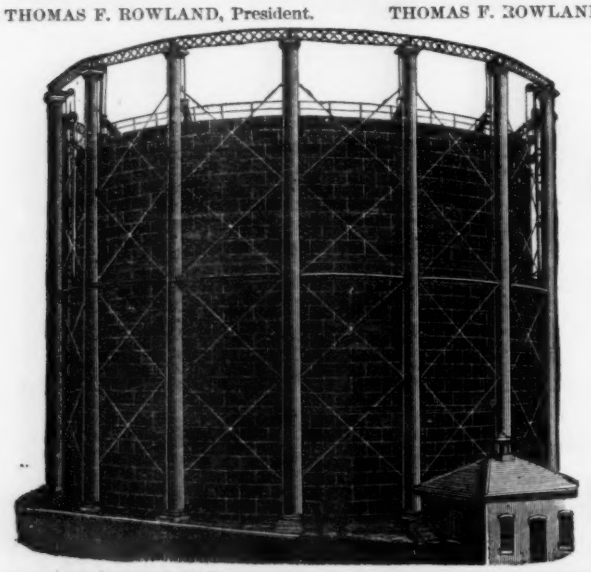

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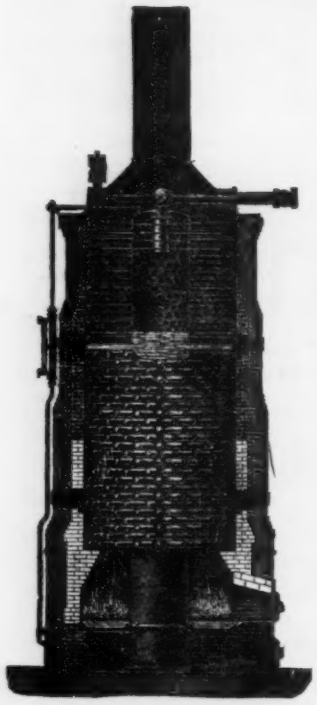

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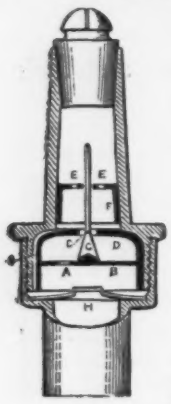

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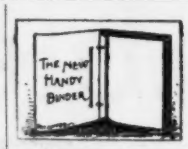

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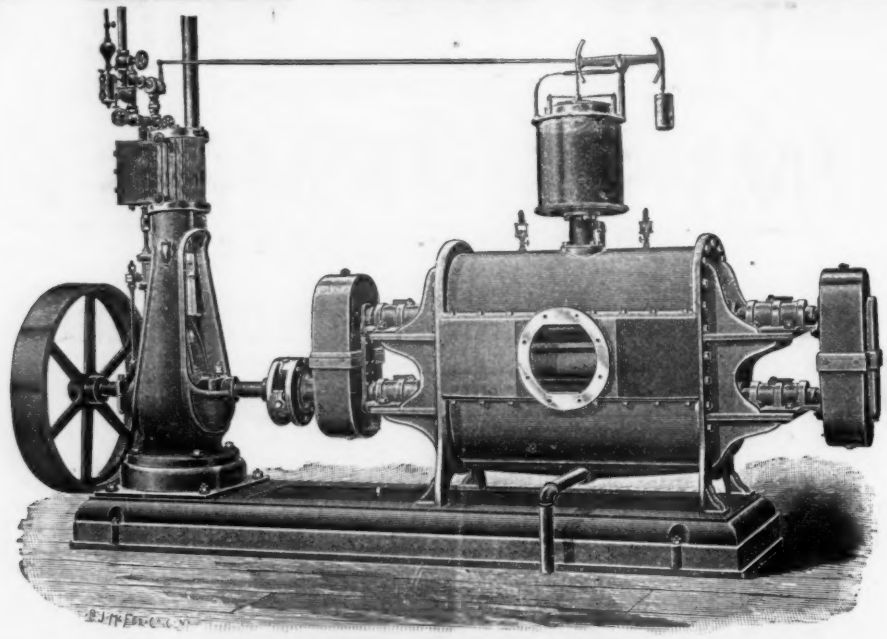

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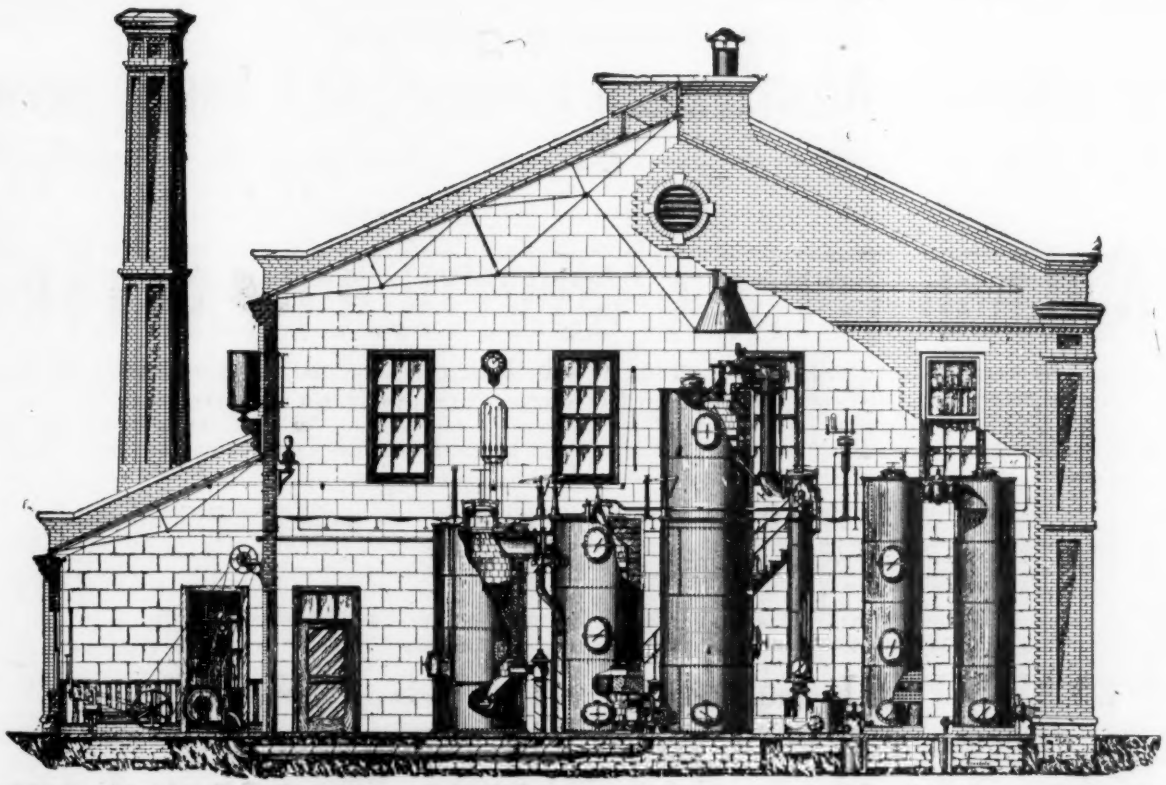

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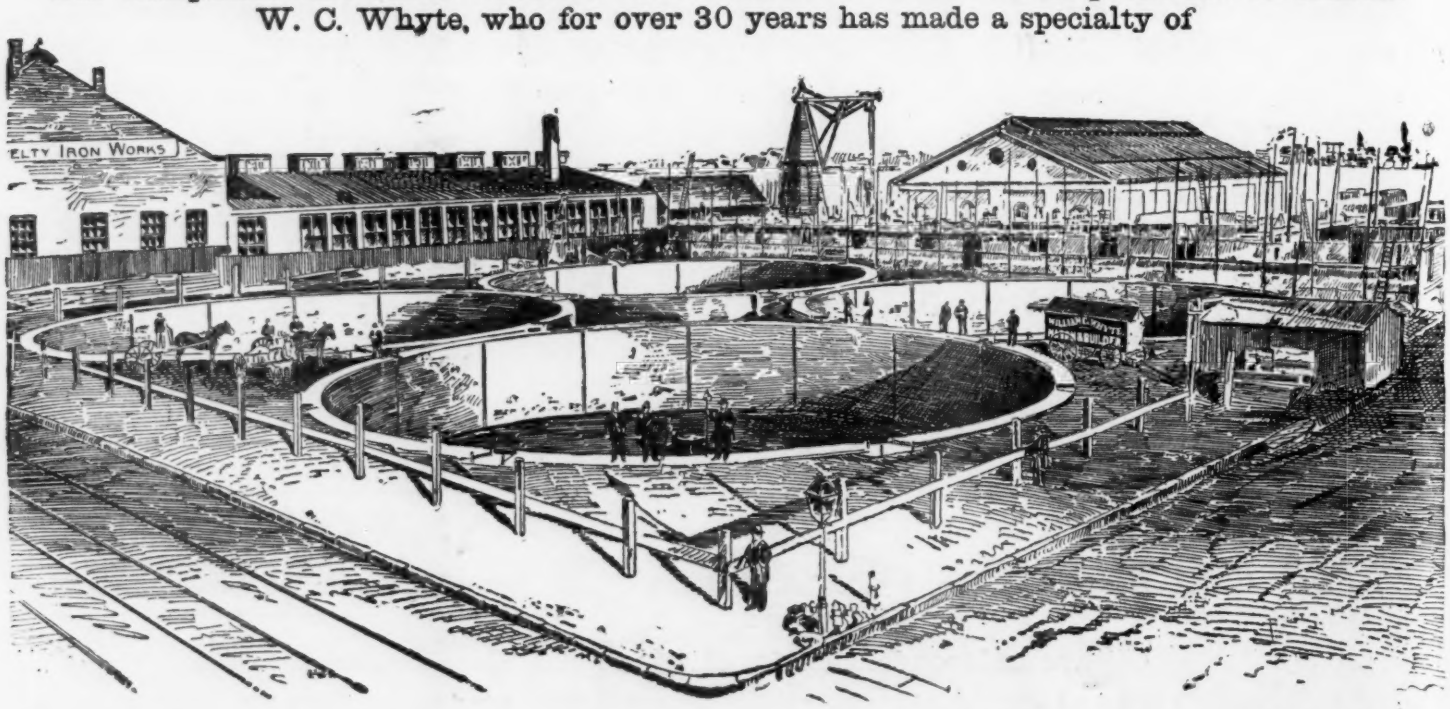

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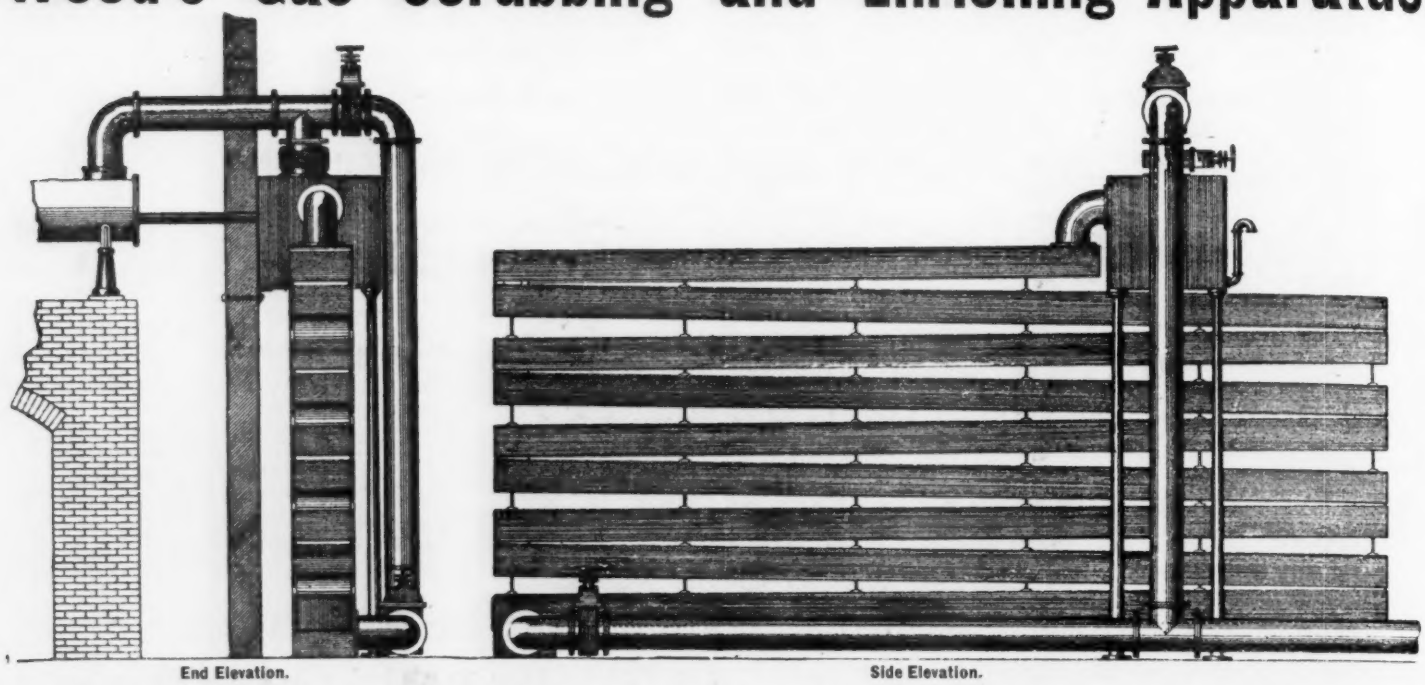

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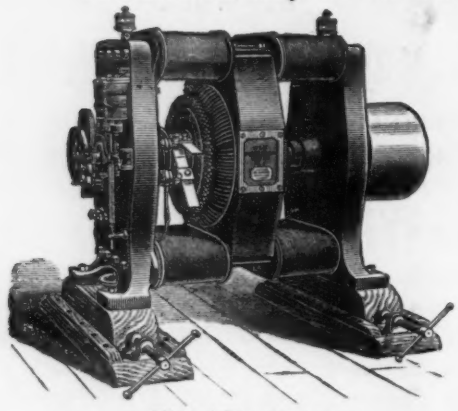

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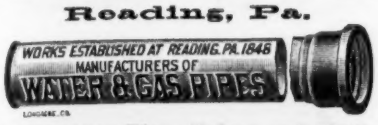

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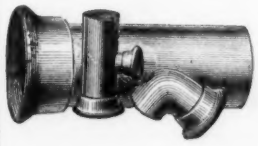

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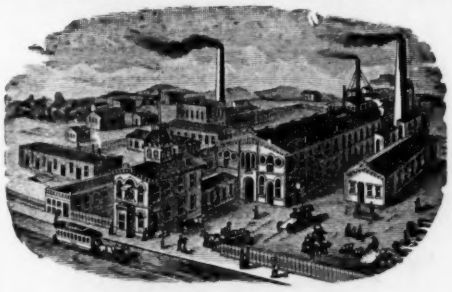

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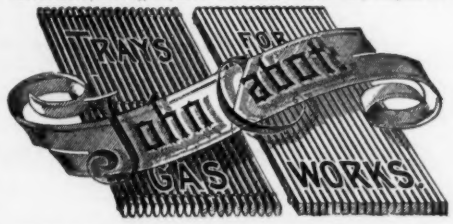

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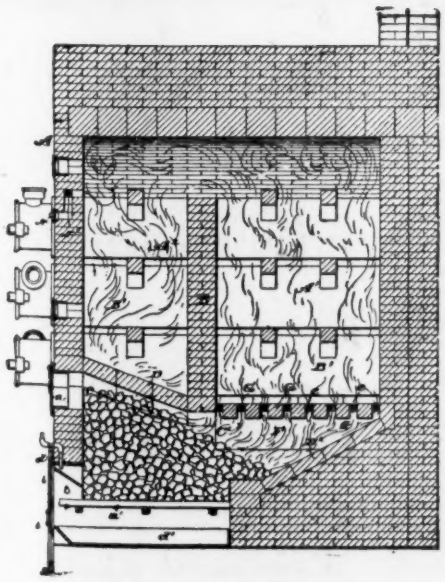

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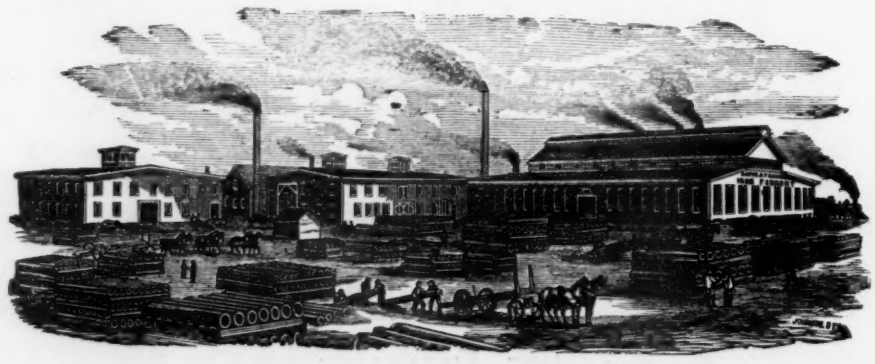

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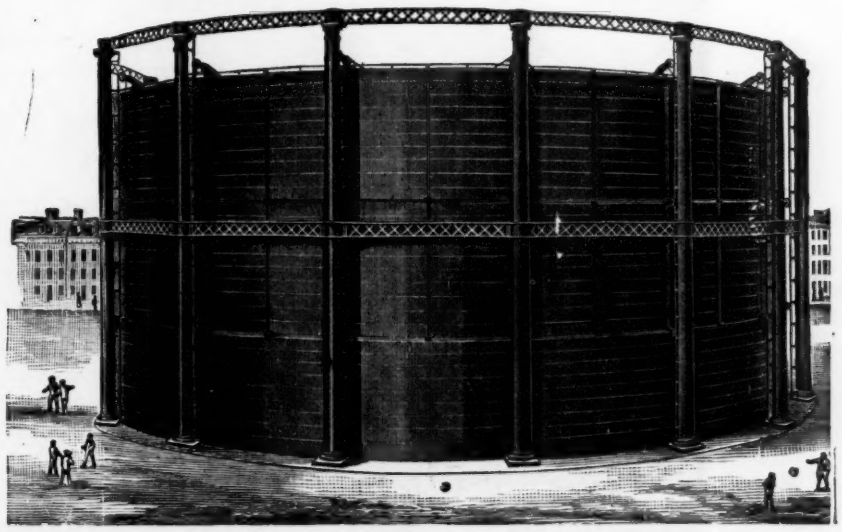

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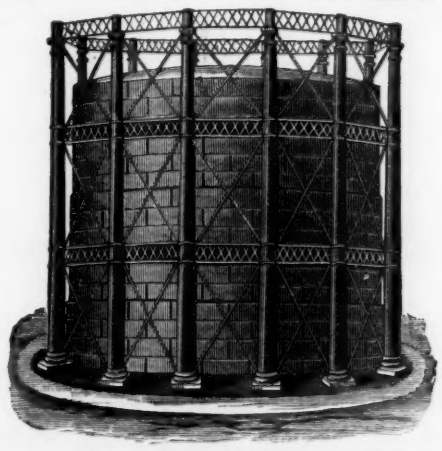

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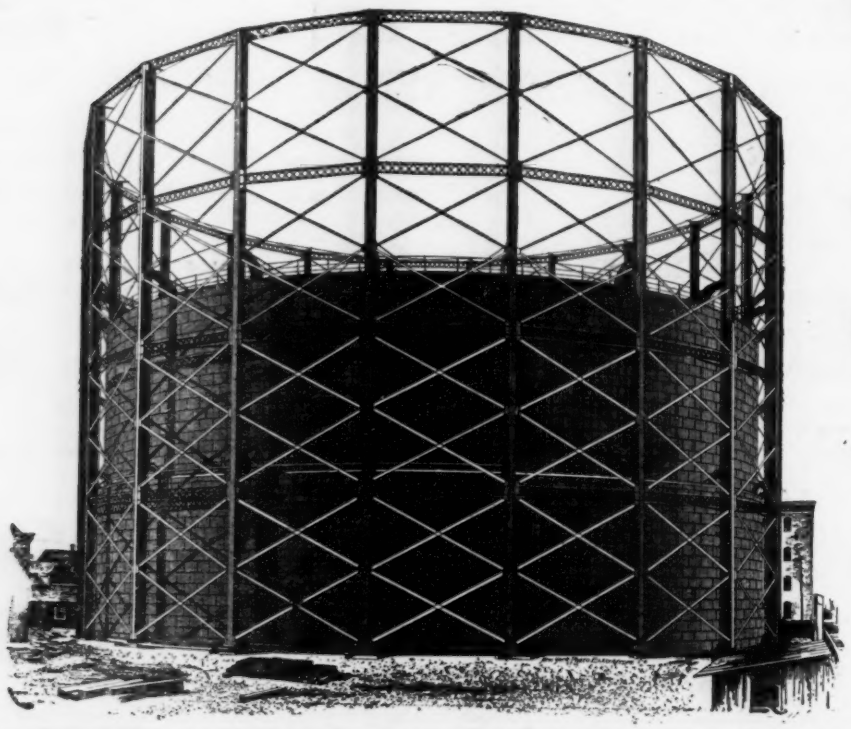

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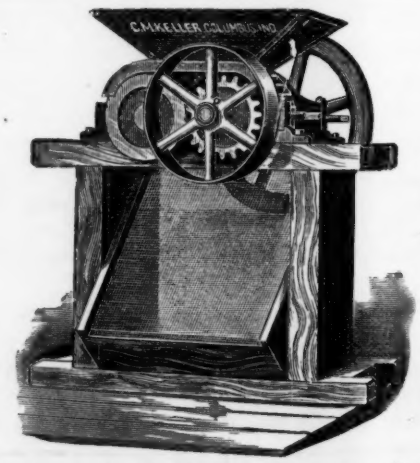

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Stove.	*Oven.*	*Broiler.*	*Top.*
31 inches high.	9¾ inches high.	10 inches high.	21 inches high.
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